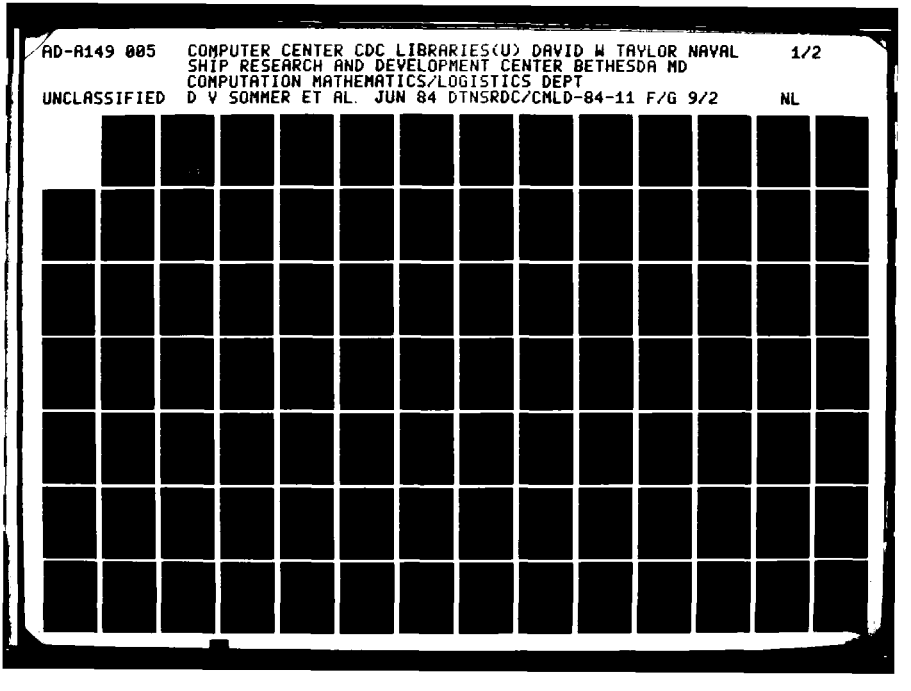
AD-A149 005 COMPUTER CENTER CDC LIBRARIES(U) DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER BETHESDA MD COMPUTATION MATHEMATICS/LOGISTICS DEPT
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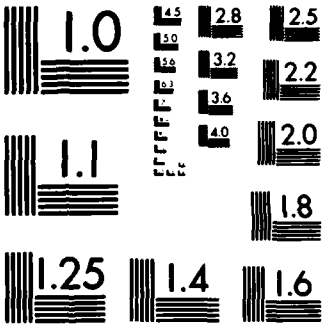

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Maryland 20084

COMPUTER CENTER
CDC
LIBRARIES

by

David V. Sommer
Sharon E. Good

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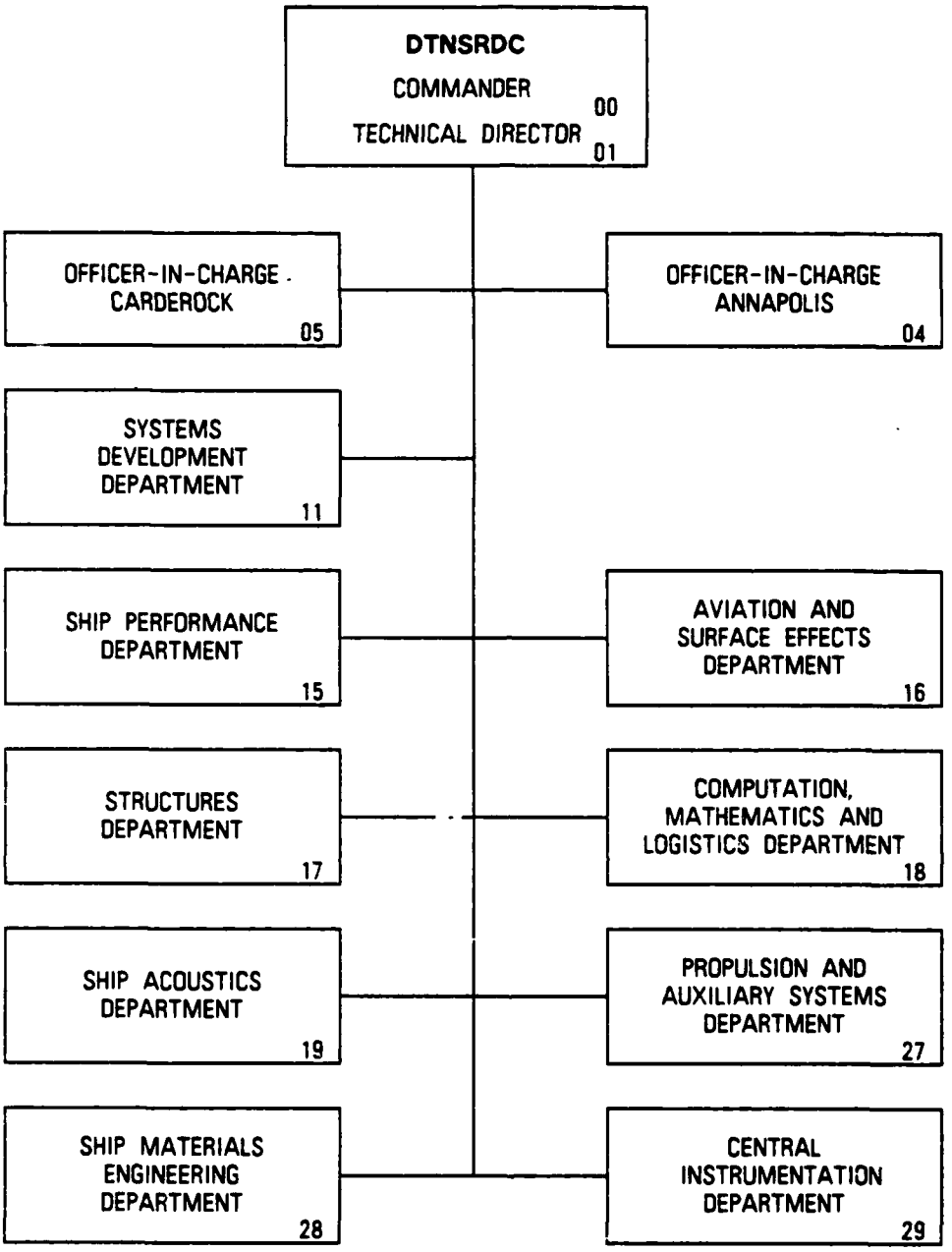
Computation, Mathematics and Logistics Department
Departmental Report

June 1984

CMLD-84-11

MAJOR DTNSRDC ORGANIZATIONAL COMPONENTS



SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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4. TITLE (and Subtitle) COMPUTER CENTER CDC LIBRARIES		5. TYPE OF REPORT & PERIOD COVERED FINAL 6.PERFORMING ORG. REPORT NUMBER
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

COMPUTER PROGRAMS	SCIENTIFIC SUBROUTINES
CATALOGUED PROCEDURES	SOFTWARE DOCUMENTATION
FORTRAN	STATISTICS
FUNCTIONAL CATEGORIES	UTILITIES

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

THE COMPUTER CENTER CDC LIBRARIES (CLIB) MANUAL IS A CROSS REFERENCE VOLUME FOR MANY SUBPROGRAMS, PROGRAMS, UTILITIES AND PROCEDURES AVAILABLE ON THE CDC CYBER 170 COMPUTERS AT DTNSRDC. CLIB LISTS THE ROUTINES BY FUNCTIONAL CATEGORY AND ALPHABETICALLY, BY LIBRARY, WITH DESCRIPTIVE TITLES.

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S/N 0102-LF-014-6601

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DAVID W. TAYLOR
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* *
* *
* COMPUTER CENTER CDC LIBRARIES *
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BY
DAVID V SOMMER
SHARON E GOOD
USER SERVICES BRANCH

CODE 1892

RE: Proprietary Information, Pages 3-10, 3-37
These pages do not contain proprietary information. It means users cannot get source from DTNSRDC.
Per Ms. Sharon Good, DTNSRDC

COMPUTATION, MATHEMATICS AND LOGISTICS DEPARTMENT
DEPARTMENTAL REPORT

JUNE 1984

CMLD-84-11

TABLE OF CONTENTS

***** INTRODUCTION *****

THE COMPUTER CENTER MAKES AVAILABLE ON THE CDC COMPUTERS, IN ADDITION TO THE NOS/BE OPERATING SYSTEM, A WIDE VARIETY OF BOTH SCIENTIFIC AND UTILITY PROGRAMS, SUBPROGRAMS AND CATALOGUED PROCEDURES. MOST OF THE ROUTINES ARE MAINTAINED IN LIBRARIES ON PERMANENT FILES AND MAY BE INVOKED BY THE APPROPRIATE (LOADER) CONTROL CARDS. A FEW PROGRAMS ARE AVAILABLE AS INDEPENDENT PERMANENT FILES.

THE CLIB-SERIES OF MANUALS CONSISTS OF THE FOLLOWING, WHICH DESCRIBE THE CONTENTS OF THE VARIOUS CDC 6000 LIBRARIES MAINTAINED BY THE COMPUTER CENTER:

CLIB - COMPUTER CENTER CDC LIBRARIES	CMLD-84-11
CLIB/N - COMPUTER CENTER CDC LIBRARIES/NSRDC AND NSRDC5 (SUBPROGRAMS)	CMLD-84-12
CLIB/P - COMPUTER CENTER CDC LIBRARIES/PROCFIL (PROCEDURES)	CMLD-84-13
CLIB/U - COMPUTER CENTER CDC LIBRARIES/UTILITY (PROGRAMS)	CMLD-84-14
CLIB/M - COMPUTER CENTER CDC LIBRARIES/MNSRDC (PROGRAMS)	

THIS MANUAL, CLIB, IS A CROSS-REFERENCE MANUAL WHICH DESCRIBES ALL THE LIBRARIES AND INDICATES A SOURCE FOR MORE COMPLETE DOCUMENTATION ON HOW TO USE THE ROUTINES IN THE LIBRARIES. REFERENCES MAY BE TO OTHER PUBLISHED BOOKS, MACHINE-READABLE DOCUMENTATION OR MASTER COPIES ON FILE IN USER SERVICES. THE OTHER MANUALS IN THIS SERIES CONTAIN MACHINE-READABLE DOCUMENTS.

ALL REFERENCE MATERIAL IS AVAILABLE FOR PERUSAL IN USER SERVICES (CARDEROCK: BLDG 17, ROOM 100, (202) 227-1907; ANNAPOLIS: BLDG 100, ROOM 2-J, (301) 267-3343). COPIES OF THE CLIB-SERIES MAY BE OBTAINED FROM USER SERVICES.

*** HOW TO USE THIS MANUAL ***

THE ROUTINES ARE CLASSIFIED IN ONE OR MORE FUNCTIONAL CATEGORIES (SEE PAGE 1-3 FOR A LIST OF CATEGORIES). THEY ARE LISTED, BEGINNING ON PAGE 1-6, UNDER THE VARIOUS CATEGORIES. EACH ENTRY IN THIS LIST INDICATES THE TYPE OF ROUTINE, THE LIBRARY (IF ANY) WHERE IT MAY BE FOUND, AND THE LOCATION OF THE DETAILED DOCUMENT WHICH DESCRIBES ITS USE.

THE ROUTINES LISTED IN THIS MANUAL ARE DIVIDED BY TYPE (PROGRAM, SUBPROGRAM OR CATALOGUED PROCEDURE), IN CHAPTERS 2, 3 AND 4, RESPECTIVELY. THESE CHAPTERS DESCRIBE THE VARIOUS LIBRARIES AVAILABLE AND LIST THE ROUTINES IN EACH LIBRARY (WITH A DESCRIPTIVE TITLE) ALPHABETICALLY.

*** HOW TO PRINT INDIVIDUAL DOCUMENTS ***

ALL DOCUMENT FILES RESIDE ON THE MASS STORAGE SYSTEM (MSS). YOUR MSACCES PASSWORD MUST BE SUBMITTED TO THE SYSTEM BEFORE DOCUMENTS CAN BE OBTAINED. THIS MAY BE DONE WITH A SEPARATE 'MSACCES' COMMAND OR BY USING THE MSACCES PARAMETER IN THE BEGIN STATEMENT.

TO PRINT A DOCUMENT:

BEGIN,DOCGET,,<LIBRARY>,,<ROUTINE>,OUTPUT,MSACCES=<PASSWORD>.

WHERE <LIBRARY> IS THE LIBRARY CONTAINING THE ROUTINE
<ROUTINE> IS THE NAME OF THE ROUTINE WHOSE DOCUMENTATION IS DESIRED.

TO PRINT THE DOCUMENT(S) ON THE XEROX 8700, EITHER:

A) ADD 'FID=<FID>' TO THE 'BEGIN,DOCGET,....'
WHERE <FID> IS THE FILE ID FOR THE BANNER

B) USE
BEGIN,XEROX,,OUTPUT,FID,,DOCPRT.

*** FUNCTIONAL CATEGORIES ***

THE FOLLOWING FUNCTIONAL CATEGORIES ARE USED AT DTNSRDC. THOSE PRECEDED BY AN ASTERISK (*) ARE LOCAL DTNSRDC CATEGORIES. ALL OTHERS ARE FROM THE VIM (THE CDC USERS GROUP) LIST.

A0 ARITHMETIC ROUTINES
A1 REAL NUMBERS
A2 COMPLEX NUMBERS
A3 DECIMAL
A4 I/O ROUTINES

B0 ELEMENTARY FUNCTIONS
B1 TRIGONOMETRIC
B2 HYPERBOLIC
B3 EXPONENTIAL AND LOGARITHMIC
B4 ROOTS AND POWERS

C0 POLYNOMIALS AND SPECIAL FUNCTIONS
C1 EVALUATION OF POLYNOMIALS
C2 ROOTS OF POLYNOMIALS
C3 EVALUATION OF SPECIAL FUNCTIONS (NON-STATISTICAL)
C4 SIMULTANEOUS NON-LINEAR ALGEBRAIC EQUATIONS
C5 SIMULTANEOUS TRANSCENDENTAL EQUATIONS
* C6 ROOTS OF FUNCTIONS

D0 OPERATIONS ON FUNCTIONS AND SOLUTIONS OF DIFFERENTIAL EQUATIONS
D1 NUMERICAL INTEGRATION
D2 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS
D3 NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS
D4 NUMERICAL DIFFERENTIATION

E0 INTERPOLATION AND APPROXIMATIONS
E1 TABLE LOOK-UP AND INTERPOLATION
E2 CURVE FITTING
E3 SMOOTHING
E4 MINIMIZING OR MAXIMIZING A FUNCTION

F0 OPERATIONS ON MATRICES, VECTORS & SIMULTANEOUS LINEAR EQUATIONS
F1 VECTOR AND MATRIX OPERATIONS
F2 EIGENVALUES AND EIGENVECTORS
F3 DETERMINANTS
F4 SIMULTANEOUS LINEAR EQUATIONS

G0 STATISTICAL ANALYSIS AND PROBABILITY
G1 DATA REDUCTION (COMMON STATISTICAL PARAMETERS)
G2 CORRELATION AND REGRESSION ANALYSIS
G3 SEQUENTIAL ANALYSIS
G4 ANALYSIS OF VARIANCE
G5 TIME SERIES
G6 SPECIAL FUNCTIONS (INCLUDES RANDOM NUMBERS AND PDF'S)
* G7 MULTIVARIATE ANALYSIS AND SCALE STATISTICS
* G8 NON-PARAMETRIC METHODS AND STATISTICAL TESTS
* G9 STATISTICAL INFERENCE

H0 OPERATIONS RESEARCH TECHNIQUES, SIMULATION & MANAGEMENT SCIENCE
H1 LINEAR PROGRAMMING
H2 NON-LINEAR PROGRAMMING
H3 TRANSPORTATION AND NETWORK CODES
H4 SIMULATION MODELING
H5 SIMULATION MODELS
H6 CRITICAL PATH PROGRAMS
H8 AUXILIARY PROGRAMS
H9 COMBINED

I0 INPUT
I1 BINARY
I2 OCTAL
I3 DECIMAL
I4 BCD (HOLLERITH)
I9 COMPOSITE

J0 OUTPUT
J1 BINARY
J2 OCTAL
J3 DECIMAL
J4 BCD (HOLLERITH)
J5 PLOTTING
J7 ANALOG
J9 COMPOSITE

K0 INTERNAL INFORMATION TRANSFER
K1 EXTERNAL-TO-EXTERNAL
K2 INTERNAL-TO-INTERNAL (RELOCATION)
K3 DISK
K4 TAPE
K5 DIRECT DATA DEVICES

L0 EXECUTIVE ROUTINES
L1 ASSEMBLY
L2 COMPILING
L3 MONITORING
L4 PREPROCESSING
L5 DISASSEMBLY AND DERELATIVIZING
L6 RELATIVIZING
L7 COMPUTER LANGUAGE TRANSLATORS

M0 DATA HANDLING
M1 SORTING
M2 CONVERSION AND/OR SCALING
M3 MERGING
M4 CHARACTER MANIPULATION
M5 SEARCHING, SEEKING, LOCATING
M6 REPORT GENERATORS
M9 COMPOSITE

N0 DEBUGGING
N1 TRACING AND TRAPPING
N2 DUMPING
N3 MEMORY VERIFICATION AND SEARCHING
N4 BREAKPOINT PRINTING

O0 SIMULATION OF COMPUTERS AND DATA PROCESSORS (INTERPRETERS)
O1 OFF-LINE EQUIPMENT (LISTERS, REPRODUCERS, ETC.)
O3 COMPUTERS
O4 PSEUDO-COMPUTERS
O5 SOFTWARE SIMULATION OF PERIPHERALS
O9 COMPOSITE

P0 DIAGNOSTICS (HARDWARE MALFUNCTION)

Q0 SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS
Q1 CLEAR/RESET
Q2 CHECKSUM ACCUMULATION AND CORRECTION
Q3 FILE MANIPULATION
Q4 INTERNAL HOUSEKEEPING, SAVE, RESTORE, ETC.
Q5 REPORT GENERATOR SUBROUTINES
Q6 PROGRAM DOCUMENTATION: FLOW CHARTS, DOCUMENT STANDARDIZATION
Q7 PROGRAM LIBRARY UTILITIES

R0 LOGIC AND SYMBOLIC
R1 FORMAL LOGIC
R2 SYMBOL MANIPULATION
R3 LIST AND STRING PROCESSING
R4 TEXT EDITING

S0 INFORMATION RETRIEVAL

T0 APPLICATIONS AND APPLICATION-ORIENTED PROGRAMS
T1 PHYSICS (INCLUDING NUCLEAR)
T2 CHEMISTRY
T3 OTHER PHYSICAL SCIENCES (GEOLOGY, ASTRONOMY, ETC.)
T4 ENGINEERING
T5 BUSINESS DATA PROCESSING
T6 MANUFACTURING (NON-DATA) PROCESSING AND PROCESS CONTROL
T7 MATHEMATICS AND APPLIED MATHEMATICS
T8 SOCIAL AND BEHAVIORAL SCIENCES AND PSYCHOLOGY
T9 BIOLOGICAL SCIENCES
T10 REGIONAL SCIENCES (GEOGRAPHY, URBAN PLANNING)
T11 COMPUTER ASSISTED INSTRUCTION

U0 LINGUISTICS AND LANGUAGES

V0 GENERAL PURPOSE UTILITY SUBROUTINES
V1 RANDOM NUMBER GENERATORS
V2 COMBINATORIAL GENERATORS: PERMUTATIONS, COMBINATIONS & SUBSETS
* V3 STANDARD AND SPECIAL PROBLEMS

X0 DATA REDUCTION
X1 RE-FORMATTING, DECOMMUTATION, ERROR DIAGNOSIS
X2 EDITING
X3 CALIBRATION
X4 EVALUATION
X5 ANALYSIS (TIME-SERIES ANALYSIS)
X6 SIMULATION (GENERATE TEST DATA FOR DATA REDUCTION SYSTEM)

Y0 INSTALLATION MODIFICATION
Y1 INSTALLATION MODIFICATION LIBRARY
Y2 NEWPL TAPE OF INSTALLATION MODIFICATIONS

Z0 ALL OTHERS

*** LIST OF ROUTINES BY FUNCTIONAL CATEGORY ***

THE FOLLOWING IS A LIST OF ROUTINES DISCUSSED IN THE CLIB SERIES OF MANUALS. EACH ROUTINE APPEARS UNDER THE CATEGORY(IES) TO WHICH IT HAS BEEN ASSIGNED.

EACH ENTRY HAS THE FOLLOWING FORM:

NAME/TYPE/LIB/DOC/

WHERE NAME IS THE NAME OF THE ROUTINE
(MAY BE ABBREVIATED TO FIT INTO 7 CHARACTERS (SPSS))

TYPE IS THE KIND OF ROUTINE
- D - MAIN PROGRAM ACTIVATED BY A DATA CARD (SPSS)
- M - MAIN PROGRAM
- P - PROCEDURE
- S - SUBPROGRAM

LIB IS THE LIBRARY CONTAINING THE ROUTINE
(THE NUMBER IN PARENTHESES FOLLOWING EACH LIBRARY NAME BELOW IS THE PAGE IN THIS MANUAL WHERE THE LIBRARY IS DISCUSSED)
- A - ARLNALG (3-2)
- B - BIMEDP (2-1)
- D - SANDIA (3-71)
- E - EISPACK (3-4)
- F - FUNPACK (3-8)
- I - IMSL (3-10)
- K - MINPACK (3-36)
- L - LINPACK (3-33)
- M - MSL (3-37)
- N - NSRDC (3-57)
- P - PROCFIL (4-1)
- R - MNSRDC (2-4)
- S - SPSS (2-5)
- T - PASCAL (2-13)
- U - UTILITY (2-8)
- 5 - NSRDC5 (3-68)
- BLANK - NOT IN A LIBRARY

DOC INDICATES THE MANUAL WHERE THE ROUTINE IS DOCUMENTED
- M - CLIB/MNSRDC (PROGRAMS)
- N - CLIB/NSRDC AND NSRDC5 (SUBPROGRAMS)
- P - CLIB/PROCFIL (PROCEDURES)
- R - CCRM (COMPUTER CENTER REFERENCE MANUAL) (MAY CONTAIN ENOUGH INFORMATION TO USE THE ROUTINE OR A FURTHER REFERENCE.)
- U - CLIB/UTILITY (PROGRAMS)
- * - USER SERVICES MAY HAVE THE DOCUMENT
- BLANK - FOR DOCUMENTATION LOCATION, SEE THE DISCUSSION OF THAT LIBRARY IN THIS MANUAL

A0 ARITHMETIC ROUTINES

FAFRAC /S/M/ /	HCF /S/M/ /	VDCPS /S/I/ /
FFRAC /S/M/ /	ICOMN /S/N/*/	
FMFRAC /S/M/ /	LCM /S/M/ /	

A1 REAL NUMBERS

AMCON /S/M/ /	ISUMIT /S/N/N/	SUMIT /S/N/N/
DASUM /S/I/ /	NFILL /S/N/N/	

A2 COMPLEX NUMBERS

CADR /S/M/ /	COMBES /S/M/ /	MULLP /S/M/ /
CBAREX /S/M/ /	CPDIV /S/M/ /	POLYMUL/M/R/M/
CCOMPE /S/M/ /	CPOLRT /S/M/ /	PSI /S/N/*/
CCONGR /S/M/ /	CPTRAN /S/M/ /	SASUM /S/I/ /
CDERIV /S/M/ /	CQDIV /S/M/ /	SCASUM /S/I/ /
CFBSUM /S/M/ /	CREV /S/M/ /	SUBDIA /S/M/ /
CGITRF /S/M/ /	CSBR /S/M/ /	VALVEC /S/M/ /
CGLESM /S/M/ /	CSHRNK /S/M/ /	VECORD /S/M/ /
CINPRD /S/M/ /	ELRH1C /S/I/ /	ZAFUJ /S/M/ /
CINT /S/M/ /	ELRH2C /S/I/ /	ZAFUM /S/M/ /
CITERF /S/M/ /	ELZHC /S/I/ /	ZAFUR /S/M/ /
CLDIV /S/M/ /	ELZVC /S/I/ /	ZCOUNT /S/M/ /
CMPINV /S/N/N/	HARM /S/M/ /	ZCPOLY /S/I/ /
CMPYR /S/M/ /	HELP /S/M/ /	ZQADC /S/I/ /
CNSLVL /S/M/ /	HELP /S/N/N/	ZQADR /S/I/ /

A4 I/O ROUTINES

XEROX /P/P/P/

B0 ELEMENTARY FUNCTIONS

DNRM2 /S/I/ /

B1 TRIGONOMETRIC

COTAN /S/N/*/	SICI /S/M/ /

B3 EXPONENTIAL AND LOGARITHMIC

CBAREX /S/M/ /

B4 ROOTS AND POWERS

DPROOT /S/N/N/	PROOT /S/N/N/	SUMPS /S/M/ /

C1 EVALUATION OF POLYNOMIALS

ADR /S/M/ /	CQDIV /S/M/ /	PARFAC /S/M/ /
APOWR /S/N/*/	CREV /S/M/ /	PDIV /S/M/ /
BPOWR /S/N/*/	CSBR /S/M/ /	POLDIV /S/N/*/
CADR /S/M/ /	CSHRNK /S/M/ /	POWR1 /S/N/*/
CCOMPE /S/M/ /	DERIV /S/M/ /	POWR2 /S/N/*/
CDERIV /S/M/ /	EVREAL /S/M/ /	PROD2 /S/N/*/
CLDIV /S/M/ /	FMULT1 /S/M/ /	PTRAN /S/M/ /
CMPYR /S/M/ /	HIFAC /S/N/*/	QDIV /S/M/ /
CNSLVL /S/M/ /	IBCEVU /S/I/ /	REV /S/M/ /
COMPEV /S/M/ /	ICSEVU /S/I/ /	SBR /S/M/ /
COSEVL /S/M/ /	LDIV /S/M/ /	SHRINK /S/M/ /
CPDIV /S/M/ /	MPYR /S/M/ /	SINEVL /S/M/ /
CPTRAN /S/M/ /	NSLVL /S/M/ /	

C2 ROOTS OF POLYNOMIALS

CINT	/S/M/ /	MULLP	/S/M/ /	ZCPOLY	/S/I/ /
CPOLRT	/S/M/ /	NROOTS	/S/N/*/	ZPOLR	/S/I/ /
DPROOT	/S/N/N/	POLYMUL	/M/R/M/	ZQADC	/S/I/ /
HELP	/S/M/ /	PROOT	/S/M/ /	ZQADR	/S/I/ /
HELP	/S/N/N/	PROOT	/S/N/N/	ZRPOLY	/S/I/ /
INT	/S/M/ /	QUART	/S/N/*/		

C3 EVALUATION OF SPECIAL FUNCTIONS (NON-STATISTICAL)

AI	/S/N/*/	COMBES	/S/M/ /	GAMMA	/S/N/N/
ALGAMA	/S/I/ /	COMBES	/S/N/*/	HANKEL	/S/M/ /
BEJY0	/S/N/*/	DAW	/S/F/ /	LOGGAM	/S/M/ /
BEJY1	/S/N/*/	EI	/S/F/ /	LOGGAM	/S/N/*/
BESEI0	/S/F/ /	ELF	/S/M/ /	MERFCI	/S/I/ /
BESEI1	/S/F/ /	ELIEM	/S/F/ /	MERFI	/S/I/ /
BESEK0	/S/F/ /	ELIE1	/S/F/ /	MMBSI0	/S/I/ /
BESEK1	/S/F/ /	ELIKM	/S/F/ /	MMBSI1	/S/I/ /
BESI0	/S/F/ /	ELIK1	/S/F/ /	MMBSJ0	/S/I/ /
BESI1	/S/F/ /	ELIPE	/S/F/ /	MMBSJ1	/S/I/ /
BESJ0	/S/F/ /	ELIPK	/S/F/ /	MMBSK0	/S/I/ /
BESJ1	/S/F/ /	ELK	/S/M/ /	MMBSK1	/S/I/ /
BESK0	/S/F/ /	ELLI	/S/N/N/	MMBSYN	/S/I/ /
BESK1	/S/F/ /	ELLIP	/S/N/*/	MMDAS	/S/I/ /
BESNIS	/S/M/ /	EL3	/S/M/ /	MMDEI	/S/I/ /
BESNKS	/S/M/ /	EONE	/S/F/ /	MMDELE	/S/I/ /
BESSI	/S/N/N/	ERF	/S/I/ /	MMDELK	/S/I/ /
BESSJ	/S/N/N/	ERF	/S/M/ /	MMKELD	/S/I/ /
BESSK	/S/N/N/	ERF	/S/N/*/	MMKEL0	/S/I/ /
BESSY	/S/N/N/	ERFC	/S/I/ /	MMKEL1	/S/I/ /
BESY	/S/F/ /	ERFINV	/S/M/ /	MMPSI	/S/I/ /
BSJ	/S/M/ /	ERROR	/S/N/*/	NBESJ	/S/M/ /
BSJ	/S/N/N/	EXPEI	/S/F/ /	PSI	/S/F/ /
CBSF	/S/N/*/	EXPINT	/S/N/*/	PSI	/S/N/*/
CEI3	/S/N/*/	FRESNEL	/S/N/N/	RBESY	/S/M/ /
CELLI	/S/N/N/	GAMAIN	/S/M/ /	SNCNDN	/S/N/N/
CEL3	/S/M/ /	GAMCAR	/S/N/N/	VCONVO	/S/I/ /
CHEBEV	/S/M/ /	GAMMA	/S/I/ /	YNU	/S/F/ /
CHTOL	/S/M/ /	GAMMA	/S/M/ /		

C4 SIMULTANEOUS NON-LINEAR ALGEBRAIC EQUATIONS

HYBRD	/S/K/ /	NEWT	/S/M/ /	RQNWT	/S/M/ /
HYBRD1	/S/K/ /	NONLIQ	/S/M/ /	ZSYSTM	/S/I/ /
HYBRJ	/S/K/ /	NRSG	/S/M/ /		
HYBRJ1	/S/K/ /	QNWT	/S/M/ /		

C5 SIMULTANEOUS TRANSCENDENTAL EQUATIONS

QNWT	/S/M/ /	RQNWT	/S/M/ /

C6 ROOTS OF FUNCTIONS

ROOTER	/S/N/*/	ZANLYT	/S/I/ /	ZREAL1	/S/I/ /
ZAFUJ	/S/M/ /	ZBRENT	/S/I/ /	ZREAL2	/S/I/ /
ZAFUM	/S/M/ /	ZCOUNT	/S/M/ /		
ZAFUR	/S/M/ /	ZFALSE	/S/I/ /		

D0 OPERATIONS ON FUNCTIONS AND SOLUTIONS OF DIFFERENTIAL EQUATIONS

PADE	/S/M/ /	RATL	/S/M/ /

D1 NUMERICAL INTEGRATION

DBCEVU /S/I/ /	HERMIT /S/M/ /	SICI /S/M/ /
DBCQDU /S/I/ /	LAGRAN /S/M/ /	SIMP /S/N/*/
DBLINT /S/I/ /	LAGUER /S/M/ /	SIMPRC /S/M/ /
DCADRE /S/I/ /	LEGEND /S/M/ /	SIMPUN /S/N/N/
DCSQDU /S/I/ /	PARBL /S/M/ /	TRGINT /S/M/ /
FGI /S/N/*/	QUAD /S/M/ /	UNCSPL /S/M/ /
FNOL3 /S/N/*/	QUADG /S/N/N/	XFIL /S/N/*/
GMI /S/M/ /	ROMBG /S/M/ /	

D2 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

DE /S/D/ /	DTPTB /S/I/ /	MIMIC /M/ /R/
DEROOT /S/D/ /	DVERK /S/I/ /	STEP /S/D/ /
DGEAR /S/I/ /	FNOL3 /S/N/*/	
DREBS /S/I/ /	KUTMER /S/N/N/	

D3 NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS

BLCKDQ /S/M/ /	LINBVP /S/M/ /	RKINIT /S/M/ /
BVP /S/M/ /	NRKVS /S/M/ /	
DRATEX /S/M/ /	NRKVSH /S/M/ /	

D4 NUMERICAL DIFFERENTIATION

CDERIV /S/M/ /	DERIV /S/M/ /	LAGDIF /S/M/ /
DCSEVU /S/I/ /	DIFTAB /S/M/ /	TRGDIF /S/M/ /

E0 INTERPOLATION AND APPROXIMATIONS

COSEVL /S/M/ /	SINEVL /S/M/ /
OMNITAB/M/ /R/	ZSRCH /S/I/ /

E1 TABLE LOOK-UP AND INTERPOLATION

ACFI /S/M/ /	ICSCCU /S/I/ /	RICH /S/M/ /
AITKEN /S/M/ /	ICSICU /S/I/ /	SEARCH /S/M/ /
ATSM /S/M/ /	ICSPLN /S/I/ /	SINSER /S/M/ /
CRDTAB /S/N/*/	IQHSCU /S/I/ /	TBLU1 /S/M/ /
DISCOT /S/N/N/	IQHSCV /S/I/ /	TBLU2 /S/M/ /
FRMRAN /S/N/*/	IRATCU /S/I/ /	TBLU3 /S/M/ /
FRMRA2 /S/N/*/	LAGINT /S/M/ /	TERP1 /S/M/ /
HRMT1 /S/M/ /	NRICH /S/M/ /	TERP2 /S/M/ /
HRMT2 /S/M/ /	ORTHON /S/M/ /	TERP3 /S/M/ /
IBCIEU /S/I/ /	PRICH /S/M/ /	

E2 CURVE FITTING

BSUBHT /S/M/ /	FFT3D /S/I/ /	LSQHTS /S/M/ /
CCONGR /S/M/ /	FFT5 /S/N/N/	LSQSIT /S/M/ /
CDECOM /S/M/ /	FHRNEW /S/M/ /	LSQSUB /S/N/*/
CFQME /S/M/ /	FITLIN /S/M/ /	OPLSA /S/N/N/
CHEBAP /S/M/ /	FLGNEW /S/M/ /	ORTHFT /S/M/ /
CHEBEV /S/M/ /	FLINV /S/I/ /	PLAGR /S/M/ /
COMCUB /S/M/ /	FLSQFY /S/M/ /	PLRG /M/R/M/
CTLLF /S/I/ /	FOURAP /S/M/ /	POLYN /S/N/N/
CUBIC2 /S/M/ /	FOURI /S/M/ /	PRONY /S/M/ /
CURV /S/M/ /	GMHAS /S/N/*/	RFFT /S/N/N/
DIFTAB /S/M/ /	GMI /S/M/ /	RFSN /S/N/N/
FCGM2 /S/M/ /	IBCICU /S/I/ /	SPLFIT /S/N/*/

E2 CURVE FITTING (CONTINUED)

FCLSQ /S/M/ /	ICSFKU /S/I/ /	SPLINE /S/M/ /
FDLSQ /S/M/ /	ICSVKU /S/I/ /	SQFIT /S/N/*/
FFT /S/N/N/	IFLSSQ /S/I/ /	SQRSL /S/L/ /
FFTCC /S/I/ /	ITRLSQ /S/M/ /	SURFS /S/M/ /
FFTRC /S/I/ /	LINWOOD/M/ /R/	UNCSPL /S/M/ /
FFT2C /S/I/ /	LSQHTM /S/M/ /	

E3 SMOOTHING

ICSMOU /S/I/ /	MILN2 /S/M/ /	SMOOTH /S/M/ /
ICSSCU /S/I/ /	SIGSMT /S/M/ /	SMOOTH /S/N/*/
ICSSV /S/I/ /	SMOCUB /S/M/ /	

E4 MINIMIZING OR MAXIMIZING A FUNCTION

CHKDER /S/K/ /	LMSTR1 /S/K/ /	ZXGSN /S/I/ /
LMDER /S/K/ /	MIGEN /S/M/ /	ZXGSP /S/I/ /
LMDER1 /S/K/ /	MINMAX /S/N/*/	ZXMIN /S/I/ /
LMDIF /S/K/ /	MINRAT /S/M/ /	ZXSSQ /S/I/ /
LMDIF1 /S/K/ /	ZSCNT /S/I/ /	
LMSTR /S/K/ /	ZXCGR /S/I/ /	

F0 OPERATIONS ON MATRICES, VECTORS & SIMULTANEOUS LINEAR EQUATIONS

OMNITAB/M/ /R/	SGECO /S/L/ /	

F1 VECTOR AND MATRIX OPERATIONS

BALANC /S/E/ /	LEQ2S /S/I/ /	USCRDM /S/I/ /
BALANC /S/M/ /	LU1 /S/A/ /	USMNMX /S/I/ /
BANDR /S/E/ /	LU2 /S/A/ /	USRDM /S/I/ /
BCHSDC /S/M/ /	LU3 /S/A/ /	USRDV /S/I/ /
BDCWNP /S/M/ /	LU4 /S/A/ /	USWBM /S/I/ /
BDECOM /S/M/ /	LU5 /S/A/ /	USWBS /S/I/ /
BDTRGI /S/I/ /	LU6 /S/A/ /	USWFM /S/I/ /
BDTRGO /S/I/ /	MATINS /S/N/N/	USWFV /S/I/ /
CAXPY /S/I/ /	MATRIX /S/N/*/	USWSM /S/I/ /
CBAL /S/E/ /	MINFIT /S/E/ /	VABMXF /S/I/ /
CCOPY /S/I/ /	ORTHES /S/E/ /	VABMXS /S/I/ /
CDECOM /S/M/ /	ORTHO /S/A/ /	VABSMF /S/I/ /
CDOTC /S/I/ /	ORTHO2 /S/A/ /	VABSMS /S/I/ /
CDOTU /S/I/ /	ORTRAN /S/E/ /	VCONVO /S/I/ /
CHSDEC /S/M/ /	PRDSUM /S/M/ /	VCVTBF /S/I/ /
CINPRD /S/M/ /	QZHES /S/E/ /	VCVTCH /S/I/ /
COMHES /S/E/ /	QZIT /S/E/ /	VCVTFB /S/I/ /
CORTH /S/E/ /	RAYLGH /S/M/ /	VCVTFQ /S/I/ /
CSCAL /S/I/ /	RLSUBM /S/I/ /	VCVTFS /S/I/ /
CSSCAL /S/I/ /	RLSUM /S/I/ /	VCVTHC /S/I/ /
CSWAP /S/I/ /	SAXPY /S/I/ /	VCVTQF /S/I/ /
CZDOTC /S/I/ /	SCHDC /S/L/ /	VCVTQS /S/I/ /
CZDOTU /S/I/ /	SCHDD /S/L/ /	VCVTSF /S/I/ /
DAXPY /S/I/ /	SCHEX /S/L/ /	VCVTSQ /S/I/ /
DCBHT /S/M/ /	SCHUD /S/L/ /	VHSH2C /S/I/ /
DCOPY /S/I/ /	SCNRM2 /S/I/ /	VHSH2R /S/I/ /
DCWNE /S/M/ /	SCOPY /S/I/ /	VHSH3R /S/I/ /
DCWNP /S/M/ /	SDOT /S/I/ /	VHS12 /S/I/ /
DDOT /S/I/ /	SDSDOT /S/I/ /	VIP /S/M/ /
DECOM /S/M/ /	SGBCO /S/L/ /	VIPA /S/M/ /
DROT /S/I/ /	SGBFA /S/L/ /	VIPD /S/M/ /

F1 VECTOR AND MATRIX OPERATIONS (CONTINUED)

DROTG /S/I/ /	SGEFA /S/L/ /	VIPDA /S/M/ /
DROTM /S/I/ /	SMTVX /S/M/ /	VIPDS /S/M/ /
DROTMG /S/I/ /	SMVX /S/M/ /	VIPRFF /S/I/ /
DSCAL /S/I/ /	SNRM2 /S/I/ /	VIPRSS /S/I/ /
DSDOT /S/I/ /	SPBCO /S/L/ /	VIPS /S/M/ /
DSWAP /S/I/ /	SPBFA /S/L/ /	VMULBB /S/I/ /
EBALAC /S/I/ /	SPDCOM /S/M/ /	VMULBF /S/I/ /
EBALAF /S/I/ /	SPOCO /S/L/ /	VMULBS /S/I/ /
ELMHES /S/E/ /	SPOFA /S/L/ /	VMULFB /S/I/ /
ELTRAN /S/E/ /	SPPCO /S/L/ /	VMULFF /S/I/ /
FABSV /S/M/ /	SPPFA /S/L/ /	VMULFM /S/I/ /
FCOMB /S/M/ /	SQRDC /S/L/ /	VMULFP /S/I/ /
FIGI /S/E/ /	SQRSL /S/L/ /	VMULFQ /S/I/ /
FIGI2 /S/E/ /	SROT /S/I/ /	VMULFS /S/I/ /
FIP /S/A/ /	SROTG /S/I/ /	VMULQB /S/I/ /
FMMX /S/M/ /	SROTM /S/I/ /	VMULQF /S/I/ /
FMTMX /S/M/ /	SROTMG /S/I/ /	VMULQQ /S/I/ /
FMTR /S/M/ /	SSCAL /S/I/ /	VMULQS /S/I/ /
FMTVCX /S/M/ /	SSICO /S/L/ /	VMULSB /S/I/ /
FMTVX /S/M/ /	SSIFA /S/L/ /	VMULSF /S/I/ /
FMVCX /S/M/ /	SSPCO /S/L/ /	VMULSQ /S/I/ /
FMVX /S/M/ /	SSPFA /S/L/ /	VMULSS /S/I/ /
FNORM1 /S/M/ /	SSVDC /S/L/ /	VNRMFI /S/I/ /
FPUR /S/M/ /	SSWAP /S/I/ /	VNRMF1 /S/I/ /
HSSN /S/M/ /	STRCO /S/L/ /	VNRMF2 /S/I/ /
HTRIDI /S/E/ /	SUBDIA /S/M/ /	VNRMS1 /S/I/ /
HTRID3 /S/E/ /	SUBDIR /S/M/ /	VNRMS2 /S/I/ /
ICAMAX /S/I/ /	SVD /S/A/ /	VPOLYF /S/I/ /
IDAMAX /S/I/ /	SVD /S/E/ /	VTPROF /S/I/ /
INRPRD /S/M/ /	TRED1 /S/E/ /	VTPROS /S/I/ /
ISAMAX /S/I/ /	TRED2 /S/E/ /	VTRAN /S/I/ /
ITERIN /S/M/ /	TRED3 /S/E/ /	VUABQ /S/I/ /
LEQT1B /S/I/ /	TRIDI /S/M/ /	VUAFB /S/I/ /
LEQT1C /S/I/ /	TRI1 /S/A/ /	VUAFQ /S/I/ /
LEQT2B /S/I/ /	TRI2 /S/A/ /	VUAFS /S/I/ /
LEQ1S /S/I/ /	TRI3 /S/A/ /	VUASB /S/I/ /
LEQ2C /S/I/ /	TRI4 /S/A/ /	VUASQ /S/I/ /

F2 EIGENVALUES AND EIGENVECTORS

BAC1 /S/A/ /	EIGRS /S/I/ /	REBAKB /S/E/ /
BAC2 /S/A/ /	EIGSYM /S/M/ /	RECOV1 /S/M/ /
BAKVEC /S/E/ /	EIGVCH /S/M/ /	RECOV2 /S/M/ /
BALBAK /S/E/ /	EIGZC /S/I/ /	REDSY1 /S/M/ /
BANDV /S/E/ /	EIGZF /S/I/ /	REDSY2 /S/M/ /
BANEIG /S/M/ /	EIG5 /S/M/ /	REDUC /S/E/ /
BISEC /S/A/ /	ELMBAK /S/E/ /	REDUC1 /S/A/ /
BISECT /S/E/ /	ELRH1C /S/I/ /	REDUC2 /S/E/ /
BQR /S/E/ /	ELRH2C /S/I/ /	RG /S/E/ /
CBABK2 /S/E/ /	ELZHC /S/I/ /	RGG /S/E/ /
CG /S/E/ /	ELZVC /S/I/ /	RITZIT /S/A/ /
CH /S/E/ /	EQRH1F /S/I/ /	RNQL1 /S/A/ /
CINVIT /S/E/ /	EQRH3F /S/I/ /	RS /S/E/ /
COMBAK /S/E/ /	EQRT1S /S/I/ /	RSB /S/E/ /
COMLR /S/E/ /	EQRT2S /S/I/ /	RSG /S/E/ /
COMLR2 /S/E/ /	EQRT3S /S/I/ /	RSGAB /S/E/ /

F2 EIGENVALUES AND EIGENVECTORS (CONTINUED)

COMQR /S/E/ /	EQZQF /S/I/ /	RSGBA /S/E/ /
COMQR2 /S/E/ /	EQZTF /S/I/ /	RSP /S/E/ /
CORTB /S/E/ /	EQZVF /S/I/ /	RST /S/E/ /
DEIG /S/M/ /	HQR /S/E/ /	RT /S/E/ /
DTSHFT /S/M/ /	HQR2 /S/E/ /	SEPAR /S/M/ /
EBALAC /S/I/ /	HTRIBK /S/E/ /	SEPAR2 /S/M/ /
EBALAF /S/I/ /	HTRIB3 /S/E/ /	SIMP /S/M/ /
EBBCKC /S/I/ /	IMQL1 /S/A/ /	SYMLR /S/M/ /
EBBCKF /S/I/ /	IMTQLV /S/E/ /	SYMQR /S/M/ /
EHBCKF /S/I/ /	IMTQL1 /S/E/ /	TCDIAG /S/M/ /
EHBCKH /S/I/ /	IMTQL2 /S/E/ /	TINVIT /S/E/ /
EHESSC /S/I/ /	INIT /S/A/ /	TQLRAT /S/E/ /
EHESSF /S/I/ /	INVIT /S/E/ /	TQL1 /S/E/ /
EHOBKS /S/I/ /	LATNTR /S/M/ /	TQL2 /S/E/ /
EHOUSH /S/I/ /	MATRIX /S/N/*/	TRBAK1 /S/E/ /
EHOUSS /S/I/ /	ORTBAK /S/E/ /	TRBAK3 /S/E/ /
EIGBS /S/I/ /	QREIGN /S/M/ /	TRIDIB /S/E/ /
EIGCC /S/I/ /	QZABX /S/A/ /	TSTURM /S/E/ /
EIGCH /S/I/ /	QZVAL /S/E/ /	VALVEC /S/M/ /
EIGCHK /S/M/ /	QZVEC /S/E/ /	VARAH1 /S/N/*/
EIGCO1 /S/M/ /	RATQR /S/E/ /	VARAH2 /S/N/*/
EIGIMP /S/M/ /	REBAK /S/E/ /	VECTOR /S/M/ /
EIGRF /S/I/ /	REBAKA /S/A/ /	

F3 DETERMINANTS

BPDSOM /S/M/ /	LITWNE /S/M/ /	SPITRM /S/M/ /
DETERM /S/M/ /	LITWNP /S/M/ /	SPITRS /S/M/ /
GAUSS /S/N/N/	MATINS /S/N/N/	SPODI /S/L/ /
LESWNE /S/M/ /	PDITRM /S/M/ /	SPPDI /S/L/ /
LESWNP /S/M/ /	PDITRS /S/M/ /	SSIDI /S/L/ /
LINSYS /S/M/ /	SGBDI /S/L/ /	SSPDI /S/L/ /
LINV3F /S/I/ /	SGEDI /S/L/ /	STRDI /S/L/ /
LINV3P /S/I/ /	SPBDI /S/L/ /	

F4 SIMULTANEOUS LINEAR EQUATIONS

BFBANP /S/M/ /	LEQT1C /S/I/ /	ORIMP /S/A/ /
BFBSUM /S/M/ /	LEQT1F /S/I/ /	ORSOL /S/A/ /
BITERM /S/M/ /	LEQT1P /S/I/ /	PDITRM /S/M/ /
BITRFM /S/M/ /	LEQT2B /S/I/ /	PDITRS /S/M/ /
BITRNP /S/M/ /	LEQT2F /S/I/ /	PDLSOM /S/M/ /
BITRPD /S/M/ /	LEQT2P /S/I/ /	PDLSOS /S/M/ /
BITWNP /S/M/ /	LEQ1PB /S/I/ /	PDSFBM /S/M/ /
BLESOM /S/M/ /	LEQ1S /S/I/ /	PDSFBS /S/M/ /
BLSWNP /S/M/ /	LEQ2C /S/I/ /	QR1 /S/M/ /
BMAM /S/N/*/	LEQ2PB /S/I/ /	RQNWT /S/M/ /
BPDITM /S/M/ /	LEQ2S /S/I/ /	SCONG /S/M/ /
BPDSFB /S/M/ /	LESWNE /S/M/ /	SGBSL /S/L/ /
BPDSOM /S/M/ /	LESWNP /S/M/ /	SGEDI /S/L/ /
BSUBHT /S/M/ /	LGINF /S/I/ /	SGESL /S/L/ /
CCONGR /S/M/ /	LINSYS /S/M/ /	SGTSL /S/L/ /
CFBSUM /S/M/ /	LINV1F /S/I/ /	SPBSL /S/L/ /
CGAUSS /S/N/N/	LINV1P /S/I/ /	SPDFBM /S/M/ /
CGITRF /S/M/ /	LINV2F /S/I/ /	SPDFBS /S/M/ /
CGLESM /S/M/ /	LINV2P /S/I/ /	SPDSOM /S/M/ /

F4 SIMULTANEOUS LINEAR EQUATIONS (CONTINUED)

CITERF /S/M/ /	LINV3F /S/I/ /	SPDSOS /S/M/ /
CMPINV /S/N/N/	LINV3P /S/I/ /	SPITRM /S/M/ /
FBSUBM /S/M/ /	LIN1PB /S/I/ /	SPITRS /S/M/ /
FBSUBS /S/M/ /	LIN2PB /S/I/ /	SPODI /S/L/ /
FCGM2 /S/M/ /	LITWNE /S/M/ /	SPOSL /S/L/ /
GAUSS /S/N/N/	LITWNP /S/M/ /	SPPDI /S/L/ /
GITRFM /S/M/ /	LLBQF /S/I/ /	SPPSL /S/L/ /
GITRFS /S/M/ /	LLSQF /S/I/ /	SPTSL /S/L/ /
GLESOM /S/M/ /	LSQHTM /S/M/ /	SQRDC /S/L/ /
GLESOS /S/M/ /	LSQHTS /S/M/ /	SSIDI /S/L/ /
IMPR1 /S/A/ /	LSQSIT /S/M/ /	SSISL /S/L/ /
IMPR2 /S/A/ /	LSVDB /S/I/ /	SSPDI /S/L/ /
INVERS /S/M/ /	LSVDF /S/I/ /	SSPSL /S/L/ /
INVITR /S/M/ /	LUDAPB /S/I/ /	STRDI /S/L/ /
ITERFM /S/M/ /	LUDATF /S/I/ /	STRSL /S/L/ /
ITERFS /S/M/ /	LUDECP /S/I/ /	TRDCNP /S/M/ /
ITRPDM /S/M/ /	LUELMF /S/I/ /	TRDCOM /S/M/ /
ITRPDS /S/M/ /	LUELMP /S/I/ /	TRDFBM /S/M/ /
ITRSPM /S/M/ /	LUELPB /S/I/ /	TRDSOM /S/M/ /
ITRSPS /S/M/ /	LUREFF /S/I/ /	TRDSUB /S/M/ /
LEQS1 /S/A/ /	LUREFP /S/I/ /	TRDWNP /S/M/ /
LEQS2 /S/A/ /	LUREPB /S/I/ /	TRILOM /S/M/ /
LEQS3 /S/A/ /	MAM /S/N/*/	TRILOS /S/M/ /
LEQS4 /S/A/ /	MAM200 /S/N/*/	TRIUPM /S/M/ /
LEQS5 /S/A/ /	MATINS /S/N/N/	TRIUPS /S/M/ /
LEQS6 /S/A/ /	MATRIX /S/N/*/	TRLOIN /S/M/ /
LEQT1B /S/I/ /	OFIMA3 /S/I/ /	TRUPIN /S/M/ /

G0 STATISTICAL ANALYSIS AND PROBABILITY

ACP /S/N/*/	OMNITAB/M/ /R/	USLEAP /S/I/ /
DOV /S/N/*/	SOV /S/N/*/	USTREE /S/I/ /
EDIT /D/S/ /	TOV /S/N/*/	ZRMN /S/M/ /

G1 DATA REDUCTION (COMMON STATISTICAL PARAMETERS)

AGGREGA/D/S/ /	BEMIRO /S/I/ /	FREQUEN/D/S/ /
AGLMOD /S/I/ /	BEMMI /S/I/ /	GTMNT /S/I/ /
AMEANS /S/I/ /	BEMMO /S/I/ /	MULT RE/D/S/ /
AORDR /S/I/ /	BMDPAM /M/B/ /	OP1RAY /S/M/ /
BDCOU1 /S/I/ /	BMDP1D /M/B/ /	OP2RAY /S/M/ /
BDCOU2 /S/I/ /	BMDP2D /M/B/ /	REPORT /D/S/ /
BDLTV /S/I/ /	BMDP3D /M/B/ /	SSPAND /S/I/ /
BDS /S/N/*/	BMDP4D /M/B/ /	SSPBLK /S/I/ /
BECOR /S/I/ /	BMDP5D /M/B/ /	SSRAND /S/I/ /
BECORI /S/I/ /	BMDP6D /M/B/ /	SSRBLK /S/I/ /
BECOVM /S/I/ /	BMDP7D /M/B/ /	SSSAND /S/I/ /
BECVL /S/I/ /	BMDP8D /M/B/ /	SSSBLK /S/I/ /
BECVLI /S/I/ /	BMDP9D /M/B/ /	SSSCAN /S/I/ /
BEGRPS /S/I/ /	BREAKDO/D/S/ /	SSSEST /S/I/ /
BEIGRP /S/I/ /	CMR /S/N/*/	STUTEE /S/N/*/
BEIUGR /S/I/ /	CONDESC/D/S/ /	T-TEST /D/S/ /
BELBIN /S/I/ /	DLETE /S/M/ /	USBOX /S/I/ /
BELPOS /S/I/ /	DSCRPT /S/M/ /	USHIST /S/I/ /
BEMDP /S/I/ /	DSCRP2 /S/M/ /	USHIUT /S/I/ /
BEMIRI /S/I/ /	FILTER /S/M/ /	USHV1 /S/I/ /

G2 CORRELATION AND REGRESSION ANALYSIS

ASA /S/N/*/	LSQSIT /S/M/ /	RLGQMI /S/I/ /
BECTR /S/I/ /	MRA /S/N/*/	RLGQMO /S/I/ /
BEMIRI /S/I/ /	NONLINE/D/S/ /	RLINCF /S/I/ /
BEMIRO /S/I/ /	NONPAR /D/S/ /	RLINPF /S/I/ /
BESRB /S/I/ /	OFRESI /S/I/ /	RLLAV /S/I/ /
BESRN /S/I/ /	PARTIAL/D/S/ /	RLLMV /S/I/ /
BMDPAR /M/B/ /	PCA /S/N/*/	RLMUL /S/I/ /
BMDPLR /M/B/ /	PEARSON/D/S/ /	RLONE /S/I/ /
BMDP1R /M/B/ /	PLOT /D/S/ /	RLOPDC /S/I/ /
BMDP2R /M/B/ /	REGRESS/D/S/ /	RLPOL /S/I/ /
BMDP3R /M/B/ /	RLCOMP /S/I/ /	RLPRDI /S/I/ /
BMDP4R /M/B/ /	RLDCQM /S/I/ /	RLPRDO /S/I/ /
BMDP5R /M/B/ /	RLDCVA /S/I/ /	RLRES /S/I/ /
BMDP6R /M/B/ /	RLDCW /S/I/ /	RLSEP /S/I/ /
BMDP9R /M/B/ /	RLDOPM /S/I/ /	RLSTP /S/I/ /
CBNRHO /S/I/ /	RLEAP /S/I/ /	RSMITZ /S/I/ /
CMR /S/N/*/	RLFITI /S/I/ /	SCATTER/D/S/ /
CORCOV /S/M/ /	RLFITO /S/I/ /	SR1 /S/N/*/
G3SLS /D/S/ /	RLFOR /S/I/ /	SR2 /S/N/*/
LSQHTM /S/M/ /	RLFOTH /S/I/ /	SR3 /S/N/*/
LSQHTS /S/M/ /	RLFOTW /S/I/ /	TETRACH/D/S/ /

G3 SEQUENTIAL ANALYSIS

SURVIVA/D/S/ /

G4 ANALYSIS OF VARIANCE

ABIBN /S/I/ /	ANCOV1 /S/I/ /	BMDP2V /M/B/ /
ACRDAN /S/I/ /	ANESTE /S/I/ /	BMDP3V /M/B/ /
ACTRST /S/I/ /	ANESTU /S/I/ /	BMDP4V /M/B/ /
AFACN /S/I/ /	ANOVA /D/S/ /	BMDP7D /M/B/ /
AFACT /S/I/ /	ANOVA1 /S/N/*/	BMDP8V /M/B/ /
AGBACP /S/I/ /	ANOVA2 /S/N/*/	BRTLTT /S/M/ /
AGLMOD /S/I/ /	AORDR /S/I/ /	MANOVA /D/S/ /
AGVACL /S/I/ /	AOV /S/N/*/	NOVACOM/M/ /R/
AGXPM /S/I/ /	ARCBAN /S/I/ /	ONEWAY /D/S/ /
ALSQAN /S/I/ /	ASNKMC /S/I/ /	
AMEANS /S/I/ /	BMDP1V /M/B/ /	

G5 TIME SERIES

ASA /S/N/*/	FTAUTO /S/I/ /	FTMPS /S/I/ /
BMDP1T /M/B/ /	FTCAST /S/I/ /	FTMXL /S/I/ /
BMDP2T /M/B/ /	FTCMP /S/I/ /	FTRDIF /S/I/ /
FFTCC /S/I/ /	FTCROS /S/I/ /	FTTRN /S/I/ /
FFTRC /S/I/ /	FTCRXY /S/I/ /	FTWEIN /S/I/ /
FFTSC /S/I/ /	FTFPS /S/I/ /	FTWENM /S/I/ /
FFT2C /S/I/ /	FTFREQ /S/I/ /	FTWENX /S/I/ /
FFT3D /S/I/ /	FTGEN /S/I/ /	HARM /S/M/ /
FTARPS /S/I/ /	FTKALM /S/I/ /	SPECTRA/D/S/ /

G6 SPECIAL FUNCTIONS (INCLUDES RANDOM NUMBERS AND PDF'S)

BETAR	/S/M/ /	GTPBC	/S/I/ /	PBINOM	/S/M/ /
BMDP1S	/M/B/ /	GTPKP	/S/I/ /	PCHY	/S/M/ /
BOXJENK	/M/ /R/	GTPL	/S/I/ /	PFDIST	/S/M/ /
CHIDST	/S/M/ /	GTPOK	/S/I/ /	PGEOM	/S/M/ /
CHIPRB	/S/M/ /	GTPR	/S/I/ /	PGMMA	/S/M/ /
CHIRAB	/S/M/ /	GTPST	/S/I/ /	PHYPGE	/S/M/ /
CHIRUD	/S/M/ /	GTRN	/S/I/ /	PIBETA	/S/M/ /
CHSQO	/S/M/ /	GTRTN	/S/I/ /	PIBIN	/S/M/ /
CONRAY	/S/M/ /	GTTRT	/S/I/ /	PICHI	/S/M/ /
EXRAND	/S/M/ /	GTTT	/S/I/ /	PICHY	/S/M/ /
GFIT	/S/I/ /	IAOC	/S/N/N/	PIEXP	/S/M/ /
GGAMR	/S/I/ /	IDAYWEK	/S/N/N/	PIFDIS	/S/M/ /
GGBN	/S/I/ /	IRAND	/S/M/ /	PIGAMA	/S/M/ /
GGBNR	/S/I/ /	MDBETA	/S/I/ /	PIGEO	/S/M/ /
GGBTR	/S/I/ /	MDBETI	/S/I/ /	PIHYPG	/S/M/ /
GGCAY	/S/I/ /	MDBIN	/S/I/ /	PILGNM	/S/M/ /
GGCHS	/S/I/ /	MDBNOR	/S/I/ /	PINBIN	/S/M/ /
GGDA	/S/I/ /	MDCH	/S/I/ /	PINORM	/S/M/ /
GGDT	/S/I/ /	MDCHI	/S/I/ /	PIPOIS	/S/M/ /
GGEOT	/S/I/ /	MDCHN	/S/I/ /	PIRAYL	/S/M/ /
GGEXN	/S/I/ /	MDFD	/S/I/ /	PIS	/S/M/ /
GGEXT	/S/I/ /	MDFDRE	/S/I/ /	PIT	/S/M/ /
GGHPR	/S/I/ /	MDFI	/S/I/ /	PITRNM	/S/M/ /
GGMAR	/S/I/ /	MDGAM	/S/I/ /	PIUNF	/S/M/ /
GGMTN	/S/I/ /	MDGC	/S/I/ /	PIUNFD	/S/M/ /
GGNLG	/S/I/ /	MDGCI	/S/I/ /	PIWEBL	/S/M/ /
GGNML	/S/I/ /	MDHYP	/S/I/ /	PLGNRM	/S/M/ /
GGNPM	/S/I/ /	MDNOR	/S/I/ /	PNBIN	/S/M/ /
GGNQF	/S/I/ /	MDNRIS	/S/I/ /	PNORM	/S/M/ /
GGNSM	/S/I/ /	MDSMR	/S/I/ /	PORAND	/S/M/ /
GGPON	/S/I/ /	MDSTI	/S/I/ /	PRAYL	/S/M/ /
GGPOS	/S/I/ /	MDTD	/S/I/ /	PRBEXP	/S/M/ /
GGSPH	/S/I/ /	MDTN	/S/I/ /	PRBUNF	/S/M/ /
GGSTA	/S/I/ /	MDTNF	/S/I/ /	PTDIST	/S/M/ /
GGTRA	/S/I/ /	MDTPS	/S/I/ /	PTRNRM	/S/M/ /
GGUBFS	/S/I/ /	MMPSI	/S/I/ /	PUNFD	/S/M/ /
GGUBS	/S/I/ /	MSMRAT	/S/I/ /	PWEBL	/S/M/ /
GGUBT	/S/I/ /	NDEFT	/S/I/ /	RAND	/S/M/ /
GGUD	/S/I/ /	NDKER	/S/I/ /	RANNUM	/S/N/*/
GGUW	/S/I/ /	NDMPLE	/S/I/ /	RUNSAB	/S/M/ /
GGVCR	/S/I/ /	NONPAR	/D/S/ /	RUNSUD	/S/M/ /
GGWIB	/S/I/ /	NRAND	/S/M/ /	URAND	/S/M/ /
GTDDU	/S/I/ /	NRML	/S/M/ /	USPC	/S/I/ /
GTD2T	/S/I/ /	NRMNO	/S/M/ /	USPDF	/S/I/ /
GTNOR	/S/I/ /	PBETA	/S/M/ /	XIRAND	/S/M/ /

G7 MULTIVARIATE ANALYSIS AND SCALE STATISTICS

AFACT /S/I/ /	CANCORR/D/S/ /	OFHARR /S/I/ /
BMDPKM /M/B/ /	DISCRIM/D/S/ /	OFIMAG /S/I/ /
BMDP1M /M/B/ /	FACTOR /D/S/ /	OFPRI /S/I/ /
BMDP2M /M/B/ /	GUTTMAN/D/S/ /	OFPROT /S/I/ /
BMDP3M /M/B/ /	JFACTOR/D/S/ /	OFROTA /S/I/ /
BMDP4M /M/B/ /	OCDIS /S/I/ /	OFSCHN /S/I/ /
BMDP6M /M/B/ /	OCLINK /S/I/ /	OFSCOR /S/I/ /
BMDP7M /M/B/ /	ODFISH /S/I/ /	OPRINC /S/I/ /
BMDP8M /M/B/ /	ODNORM /S/I/ /	OTMLNR /S/I/ /
BMDP9M /M/B/ /	OFCOEF /S/I/ /	RELIABI/D/S/ /
BMDQ3M /M/B/ /	OFCOMM /S/I/ /	

G8 NON-PARAMETRIC METHODS AND STATISTICAL TESTS

BMDP1F /M/B/ /	NBQT /S/I/ /	NMKSF /S/I/ /
BMDP2F /M/B/ /	NBSDL /S/I/ /	NMKTS /S/I/ /
BMDP3F /M/B/ /	NBSIGN /S/I/ /	NMRANK /S/I/ /
BMDP3S /M/B/ /	NDKER /S/I/ /	NMTIE /S/I/ /
BMDP4F /M/B/ /	NDMPLE /S/I/ /	NONPAR /D/S/ /
CROSSTA/D/S/ /	NHEXT /S/I/ /	NPAR /D/S/ /
NAK1 /S/I/ /	NHINC /S/I/ /	NRBHA /S/I/ /
NAWNRP /S/I/ /	NKS1 /S/I/ /	NRWMD /S/I/ /
NAWRPE /S/I/ /	NKS2 /S/I/ /	NRWRST /S/I/ /
NAWRPU /S/I/ /	NMCC /S/I/ /	RSO /S/N/*/
NBCYC /S/I/ /	NMKEN /S/I/ /	SUMMARY/D/S/ /

G9 STATISTICAL INFERENCE

AGVACL /S/I/ /	BENSON /S/I/ /	CTRBYC /S/I/ /
ASNKMC /S/I/ /	BEPAT /S/I/ /	GTCN /S/I/ /
BEMNON /S/I/ /	BEPET /S/I/ /	OIND /S/I/ /
BEMSON /S/I/ /	CTPR /S/I/ /	

H1 LINEAR PROGRAMMING

ARRIBA /M/ /R/	ZX3LP /S/I/ /	
ZXOLP /S/I/ /	ZX4LP /S/I/ /	

H4 SIMULATION MODELING

GPSS /M/ /R/	MIMIC /M/ /R/	SIMII5 /M/ /R/

I0 INPUT

FASTIN /S/N/*/

I2 OCTAL

OFMTDE /S/N/N/	OFMTV /S/N/N/

I3 DECIMAL

CRDTAB /S/N/*/	USRDM /S/I/ /
USCRDM /S/I/ /	USRDV /S/I/ /

I4 BCD (HOLLERITH)

ICOM /S/N/*/	ICOMN /S/N/*/	IFMTV /S/N/N/

I9 COMPOSITE

START /S/M/ /

J1 BINARY

CV029 /M/U/U/	CV029 /P/P/P/

J2 OCTAL

PRTFL /S/N/N/

J3 DECIMAL

USLEAP /S/I/ /	USWBS /S/I/ /	USWFV /S/I/ /
USWBM /S/I/ /	USWFM /S/I/ /	USWSM /S/I/ /

J4 BCD (HOLLERITH)

BANNER /M/U/U/	BANR6 /S/5/N/	LINE8 /S/N/N/
BANNERS/M/U/U/	COMQ /P/P/P/	PM /P/P/P/
BANNERS/P/P/P/	COPYSF /M/ /R/	PRTIME /S/N/N/
BANNER3/M/U/U/	ICOM /S/N/*/	PRTYM /S/5/N/
BANNER6/M/U/U/	ICOMN /S/N/*/	REPORT /D/S/ /
BANR /S/N/N/	LINE6 /P/P/P/	TTYMSG /S/5/N/
BANR /S/5/N/	LINE6 /S/N/N/	
BANR6 /S/N/N/	LINE8 /P/P/P/	

J5 PLOTTING

BMDP5D /M/B/ /	IDDS /P/P/P/	USHIUT /S/I/ /
BMDP6D /M/B/ /	PLOT /D/S/ /	USHV1 /S/I/ /
BMDP7D /M/B/ /	PLOTMY /S/N/*/	USPC /S/I/ /
CALCFN /S/ /R/	PLOTPR /S/N/N/	USPDF /S/I/ /
CALCOMP/S/ /R/	PLOTXY /S/N/*/	USPLT /S/I/ /
CALC3D /P/P/P/	SCATTER/D/S/ /	USSLF /S/I/ /
CALC936/S/ /R/	TEKTRNX/S/ /R/	USTREE /S/I/ /
DISSPLA/S/ /R/	USBOX /S/I/ /	XPLOT /S/M/ /
HSTGRM /S/M/ /	USHIST /S/I/ /	XYPLOT /S/M/ /

J9 COMPOSITE

PRUDMP /M/U/U/	TAPDMP9/M/U/U/

K1 EXTERNAL-TO-EXTERNAL

COPYE /M/ /R/	DOCUMNT/M/U/U/	RECDEL1/P/P/P/
COPYF /M/ /R/	D2A /P/P/P/	RECGET1/P/P/P/
COPYR /M/ /R/	FETCHC /P/P/P/	RECREP1/P/P/P/
COPYRE /M/U/U/	FETCHM /P/P/P/	TAPRD /P/P/P/
COPYRM /M/ /R/	GETMS /P/P/P/	TAPWR /P/P/P/
COPYS /M/ /R/	MF2MF /P/P/P/	VAXER /M/U/U/
COPYS /P/P/P/	MF2MFA /M/U/U/	XFRC2M /M/U/U/
COPYSEL/M/U/U/	MSS2PF /P/P/P/	XFRC2MA/M/U/U/
COPYSF /M/ /R/	M2C /P/P/P/	XFRM2C /M/U/U/
CVT360 /M/ /R/	M2CALL /P/P/P/	XFRM2CA/M/U/U/
C2M /P/P/P/	PUTMS /P/P/P/	
C2MALL /P/P/P/	RECADD1/P/P/P/	

K2 INTERNAL-TO-INTERNAL (RELOCATION)

CCOPY /S/I/ /	GETDABA/S/N/N/	RCPA /S/N/N/
CMMOVEF/S/5/N/	GETRA /S/N/N/	SAXPY /S/I/ /
CSWAP /S/I/ /	MFETCH /S/N/N/	SCOPY /S/I/ /
DCOPY /S/I/ /	MOVEIT /S/N/N/	SSWAP /S/I/ /
DSWAP /S/I/ /	MSET /S/N/N/	SWAP /S/N/N/

K3 DISK

COPYL /M/ /R/	PROS2R /P/P/P/	UPDGET /P/P/P/
COPYLIB/M/U/U/	PRUDMP /M/U/U/	UPDGETS/P/P/P/
COPYLIB/P/P/P/	SELDUMP/P/P/P/	UPDGETT/P/P/P/
COPYN /M/ /R/	TRANPK /P/P/P/	UPDREPL/P/P/P/
GETOBJ /M/U/U/	UPDADD /P/P/P/	
NEWNAME/M/U/U/	UPDDELE/P/P/P/	

K4 TAPE

AUDPFT /M/U/U/	COPYBLK/P/P/P/	
COPYBFR/M/ /R/	SELLOAD/P/P/P/	

L0 EXECUTIVE ROUTINES

ANYLIB /P/P/P/	LIBPRO /P/P/P/	NOGO /P/P/P/
ANYPRO /P/P/P/	LIBPROA/P/P/P/	PROGRAM/P/P/P/
ANYPROS/P/P/P/	LIBSET1/P/P/P/	SEGLD /P/P/P/
BIGLOAD/P/P/P/	LIBSET2/P/P/P/	S2K260 /P/P/P/
CCL /M/ /R/	MNSRDC /P/P/P/	S2K280 /P/P/P/
DISPOST/P/P/P/	MYPRO /P/P/P/	TTYMSG /S/5/N/
IDDS /P/P/P/	MYPROS /P/P/P/	UTILITY/P/P/P/

L2 COMPILING

APL /M/ /R/	MNF /M/ /*/	RUNMNF /P/P/P/
BASIC /M/ /R/	PASCAL /M/T/R/	RUNPAS /P/P/P/
COBOL /M/ /R/	PLI /M/ /R/	RUNSEQ /P/P/P/
COMPASS/M/ /R/	RUNBAS /P/P/P/	RUNTS /P/P/P/
FTN4 /M/ /R/	RUNFTN /P/P/P/	SNOBOL /M/ /R/
FTN5 /M/ /R/	RUNFTN5/P/P/P/	

L4 PREPROCESSING

RATFOR /M/ /*/	TIDY /M/U/U/	

L7 COMPUTER LANGUAGE TRANSLATORS

F45 /M/ /R/	F45IT /P/P/P/	LCS /M/ /R/

M0 DATA HANDLING

COMPAR /M/U/U/	C2D /M/U/U/	EQU60 /S/N/N/
COMPSTR/S/N/N/	D2C /M/U/U/	MASKIT /S/N/N/

M1 SORTING

ASORT /S/N/N/	ISSORT /S/N/N/	SSORTL /S/N/N/
ASORTMV/S/N/N/	MSAUDIT/P/P/P/	SSORT3 /S/N/N/
AUDIT /P/P/P/	QSORT /S/N/N/	VARORD /S/M/ /
AUDSORT/M/U/U/	QSORT1 /S/N/N/	VECORD /S/M/ /
CSHUFL /S/5/N/	SORT /P/P/P/	VSRTA /S/I/ /
CSORT /S/5/N/	SORTCZ /P/P/P/	VSRTM /S/I/ /
CSORTD /S/5/N/	SORTMRG/M/ /R/	VSRTP /S/I/ /
CSORTN /S/5/N/	SORT5 /M/ /R/	VSRTR /S/I/ /
CSORT2 /S/5/N/	SSORT /S/N/N/	VSRTU /S/I/ /
DEKSORT/M/U/U/	SSORTF /S/N/N/	
HSTGRM /S/M/ /	SSORTI /S/N/N/	

M2 CONVERSION AND/OR SCALING

CHIN /S/5/N/	DATFMT /S/N/N/	MONTH /S/N/N/
CVCHIN /S/5/N/	D2A /P/P/P/	NEWDAT /S/N/N/
CVCHOL /S/5/N/	GETHOUR/S/N/N/	NEWDAT /S/5/N/
CVHOCH /S/5/N/	HEX3 /S/N/N/	S2HMS /S/5/N/
CVINCH /S/5/N/	HMS2S /S/5/N/	UNHEX3 /S/N/N/
CVT360 /M/ /R/	IHMS /S/N/N/	WEKDAY /S/N/N/
CV029 /M/U/U/	IROMAN /S/N/N/	WRITE /M/ /R/
CV029 /P/P/P/	JGDATE /S/N/N/	
DATCNV /S/N/N/	JULIAN /S/N/N/	

M3 MERGING

MERGE /M/ /R/	SORTMRG/M/ /R/

M4 CHARACTER MANIPULATION

ADJL /S/N/N/	D630I /S/N/N/	PUTCHR /S/N/N/
ADJR /S/N/N/	EXPAND /S/N/N/	REPLAC /S/N/N/
ASCADD /S/N/N/	EXPRM /S/N/N/	REPLACM/S/N/N/
ASCADM /S/N/N/	EXTBIT /S/N/N/	REPLHI /S/N/N/
ASCBSX /S/N/N/	EXTPRM /S/N/N/	REPLLO /S/N/N/
ASCDC /M/U/U/	FBINRD /S/N/N/	REPLNE /S/N/N/
ASCGET /S/N/N/	GETCHA /S/N/N/	RIGHT /S/5/N/
ASCII /S/N/N/	GETCHR /S/N/N/	SBYT /S/N/N/
ASCIII /S/N/N/	GETPRM /S/N/*/	SEMICO /S/N/N/
ASCIIO /P/P/P/	GETSTR /S/5/N/	SETREW /S/N/N/
ASCLEN /S/N/N/	IBUNP /S/N/N/	SHIFTA /S/N/N/
ASCPUT /S/N/N/	IPAKLFT/S/N/N/	SKWEZL /S/N/N/
ASHIFT /S/N/N/	ISTAPE /S/N/N/	SKWEZR /S/N/N/
CENTER /S/N/N/	ITRANS /S/5/N/	TEKTRI /S/N/N/
CENTER /S/5/N/	LBYT /S/N/N/	TRAILBZ/S/N/N/
CHFILL /S/N/N/	LEFT /S/5/N/	TRANS /S/5/N/
CHIN /S/5/N/	LEFTADJ/S/N/N/	VALDAT /S/N/N/
CHNGSEQ/S/N/N/	MOVCHAR/S/N/N/	VFILL /S/N/N/
CONTRCT/S/N/N/	MOVECM /S/N/N/	VT100I /S/N/N/
COPYEXT/M/U/U/	MOVSTR /S/N/N/	ZBLANK /S/N/N/
CVCHIN /S/5/N/	MXGET /S/N/N/	ZEROFL /S/N/N/
CVCHOL /S/5/N/	OMRONI /S/N/N/	ZEROS /S/N/N/
CVHOCH /S/5/N/	PARGET /S/N/N/	
CVINCH /S/5/N/	PUTCHA /S/N/N/	

M5 SEARCHING, SEEKING, LOCATING

AMAXE /S/N/N/	GETCHR /S/N/N/	LASTCH /S/5/N/
AMINE /S/N/N/	GETSTR /S/5/N/	LASTCHH/S/5/N/
CFIND /S/5/N/	ICAMAX /S/I/ /	LASTWRD/S/N/N/
FINDC /S/N/N/	IDAMAX /S/I/ /	LSTCH /S/5/N/
FINDW /S/N/N/	IDIGIT /S/N/N/	MAXE /S/N/N/
FINDWRD/S/N/N/	IFINDCH/S/N/N/	MINE /S/N/N/
FIRSTCH/S/5/N/	ISAMAX /S/I/ /	NFILLT /S/N/N/
FRSTCH /S/5/N/	LASTC /S/N/N/	NUMER /S/5/N/
GETCHA /S/N/N/	LASTCH /S/N/N/	VALIDT /S/N/N/

M6 REPORT GENERATORS

PR2UP /M/U/U/	QU /M/ /R/

NO DEBUGGING

ALTIME /S/N/N/	CMMPGOS/S/5/N/	MONERR /S/F/ /
ALTYM /S/5/N/	CMMPGSS/S/5/N/	PRTIME /S/N/N/
CMMPGFS/S/5/N/	GETCCL /S/N/N/	SM5PRNT/S/5/N/

N2 DUMPING

CMMDUMP/S/5/N/	DUMPA /S/N/N/	PRUDMP /M/U/U/
DMPA /S/N/N/	DUMPFL /S/N/N/	RECOVRD/S/N/N/
DMPCPA /S/N/N/	DUMPOBJ/M/U/U/	TAPDMP9/M/U/U/
DMPCPA /S/5/N/	DUMPXPK/S/5/N/	
DMPFIL /M/U/U/	FDMP /M/U/U/	

O1 OFF-LINE EQUIPMENT (LISTERS, REPRODUCERS, ETC.)

BRAILLE/M/U/U/	LISTCMP/M/U/U/	PROALL /P/P/P/
CARDS /M/U/U/	LISTEOI/M/U/U/	PRODOC /P/P/P/
CARDS2 /M/U/U/	LISTER /M/U/U/	PROLIST/P/P/P/
COPYEXT/M/U/U/	LISTM /M/U/U/	PR2UP /M/U/U/
COPYRE /M/U/U/	LISTN /M/U/U/	PURPOSE/P/P/P/
COPYSEL/M/U/U/	LISTZ /M/U/U/	RECDOC /P/P/P/
CV029 /M/U/U/	LIST1 /M/U/U/	TIDBITS/P/P/P/
CV029 /P/P/P/	LIST2 /M/U/U/	UPDDOC /P/P/P/
DOCDATE/P/P/P/	LIST3 /M/U/U/	UPDLIST/P/P/P/
DOCDOC /P/P/P/	LIST4 /M/U/U/	WARNING/S/N/N/
FRAME /M/U/U/	LMFNPFN/M/U/U/	WRITE /M/ /R/
GETREV /M/U/U/	MANUAL /M/U/U/	XDOC /M/U/U/
LINERL /M/U/U/	MANUAL /P/P/P/	
LIST /P/P/P/	PAGEPRT/M/U/U/	

PO DIAGNOSTICS (HARDWARE MALFUNCTION)

UERTST /S/I/ /

QO SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS

AC /S/N/N/	GETLGO /S/N/N/	NORERUN/P/P/P/
AC /S/5/N/	GETMFNS/P/P/P/	NUMEXEC/S/N/N/
ALTIME /S/N/N/	GETMS /P/P/P/	NUMVAR /S/N/N/
ALTYM /S/5/N/	GETPROD/P/P/P/	OFLREQ /P/P/P/
AUDIT /P/P/P/	GODROP /S/N/N/	OVLNAME/S/N/N/
AUDPFT /M/U/U/	GRIPE /P/P/P/	PAKPAS /P/P/P/
BANNER /M/U/U/	HERE /S/N/N/	PARMGET/P/P/P/
BANNERS/M/U/U/	IBL /S/N/N/	PFNEWAC/M/U/U/
BANNERS/P/P/P/	IDID /S/N/N/	PFRC /S/N/N/
BANNER3/M/U/U/	ISEC /S/N/N/	PFRC /S/5/N/
BANNER6/M/U/U/	JOBCM /S/N/N/	PM /S/5/N/
BANR /S/N/N/	JOBNAME/S/N/N/	PRTFL /S/N/N/
BANR6 /S/N/N/	JOBORG /S/N/N/	PTIM /M/U/U/
BDT /P/P/P/	JOBTIME/M/U/U/	PUTMS /P/P/P/
BUFSIZE/S/N/N/	LFPFERR/S/N/N/	REDUCE /S/N/N/
CALCIBL/M/U/U/	LIBBAM /S/N/N/	ROUTERC/S/N/N/
CBLFMT /M/U/U/	LIBSYM /S/N/N/	ROUTERC/S/5/N/
CMMMERC/S/5/N/	LINER /M/U/U/	SEND /P/P/P/
CMMUERC/S/5/N/	LINERL /M/U/U/	SKPSTAT/S/N/N/
COMQ /P/P/P/	LONGEST/M/U/U/	S2KRNM /M/U/U/
COUNTLR/M/U/U/	LPL /M/U/U/	TIMLEFT/S/N/N/
C2M /P/P/P/	LPLM /M/U/U/	TPAUDIT/P/P/P/

Q0 SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS (CONTINUED)

C2MALL /P/P/P/	MACHINE/S/N/N/	TPGET /P/P/P/
DFDATIM/M/U/U/	MAKSUB /M/U/U/	TPRLS /P/P/P/
DSAUDIT/P/P/P/	MEMUSED/S/N/N/	UHELP /S/I/ /
DSRLS /P/P/P/	MFNS /M/U/U/	UHELP1 /S/I/ /
EDIT /M/ /R/	MFRAME /S/N/N/	UHELP2 /S/I/ /
ELTIME /S/N/N/	MFRAME /S/5/N/	UHELP3 /S/I/ /
ELTYM /S/5/N/	MFX /P/P/P/	UHELP4 /S/I/ /
EOFAD /M/U/U/	MSAUD /M/U/U/	WHATLIB/M/U/U/
FETCHC /P/P/P/	MSAUDIT/P/P/P/	WHATLIB/P/P/P/
FETCHM /P/P/P/	MSAUFP1/M/U/U/	WHICHMF/M/U/U/
FRAME /M/U/U/	MSAUFP2/M/U/U/	WHICHOS/M/U/U/
FTNRFL /S/N/N/	MSSALL /P/P/P/	XEROX /P/P/P/
GETCCL /S/N/N/	MSTABLE/P/P/P/	XFRC2M /M/U/U/
GETDABA/S/N/N/	MSTBL /M/U/U/	XFRC2MA/M/U/U/
GETFIT /S/N/N/	M2C /P/P/P/	XFRM2C /M/U/U/
GETLFNS/S/N/N/	M2CALL /P/P/P/	XFRM2CA/M/U/U/

Q1 CLEAR/RESET

UERSET /S/I/ /	UGETIO /S/I/ /

Q3 FILE MANIPULATION

ANYLIB /P/P/P/	LIBSET1/P/P/P/	SKPFIL /S/N/N/
ANYPRO /P/P/P/	LIBSET2/P/P/P/	S2K260 /P/P/P/
ANYPROS/P/P/P/	MNSRDC /P/P/P/	S2K280 /P/P/P/
BIGLOAD/P/P/P/	MYPRO /P/P/P/	TTYOPN /S/5/N/
CLUNLD /S/N/N/	MYPROS /P/P/P/	UNLOAD /S/N/N/
DISPOST/P/P/P/	NOGO /P/P/P/	UPDLIST/P/P/P/
EOI /M/U/U/	PF /S/N/N/	UTILITY/P/P/P/
LIBPRO /P/P/P/	PROGRAM/P/P/P/	ZSYSEQ /S/N/N/
LIBPROA/P/P/P/	SEGLD /P/P/P/	

Q4 INTERNAL HOUSEKEEPING, SAVE, RESTORE, ETC.

ADDEXT /P/P/P/	PFRSTOR/P/P/P/	PURGEN /P/P/P/
DBUTIL /M/ /R/	PHC /P/P/P/	RENAMAC/P/P/P/
MSNEWAC/M/U/U/	PLC /P/P/P/	RENAMID/P/P/P/
NEWID /P/P/P/	PROMNT /M/U/U/	RENMID /M/U/U/
PAC /P/P/P/	PRTIME /S/N/N/	RSTORPF/M/U/U/
PAHC /P/P/P/	PRTYM /S/5/N/	SELDUMP/P/P/P/
PALC /P/P/P/	PURGALL/P/P/P/	SELLOAD/P/P/P/

Q5 REPORT GENERATOR SUBROUTINES

REPORT /D/S/ /

Q6 PROGRAM DOCUMENTATION: FLOW CHARTS, DOCUMENT STANDARDIZATION

ADDECK /M/U/U/	DOCLIST/P/P/P/	PGMTAPE/P/P/P/
DOCADD /P/P/P/	DOCREPL/P/P/P/	PURPOS /M/U/U/
DOCDAT /M/U/U/	DOCS /M/U/U/	PURPOSE/M/U/U/
DOCDELE/P/P/P/	DOCUMNT/M/U/U/	TAPLIST/M/U/U/
DOCFILE/P/P/P/	EXECARD/M/U/U/	UNDOCIT/M/U/U/
DOCGET /P/P/P/	GETDOC /M/U/U/	
DOCIT /M/U/U/	LGOTREE/P/P/P/	

Q7 PROGRAM LIBRARY UTILITIES

BINDEX /M/U/U/	LISTCMP/M/U/U/	SEGO /P/P/P/
COPYL /M/ /R/	PROADD /P/P/P/	SORTUP /M/U/U/
COPYLIB/P/P/P/	PRODELE/P/P/P/	UPDADD /P/P/P/
COPYN /M/ /R/	PROGET /P/P/P/	UPDATE /M/ /R/
DECKS /M/U/U/	PROHDR /P/P/P/	UPDDELE/P/P/P/
DEKSORT/M/U/U/	PRONAM /P/P/P/	UPDGET /P/P/P/
EDITLIB/M/ /R/	PROREPL/P/P/P/	UPDGETS/P/P/P/
ITEMIZE/M/ /R/	PROS2R /P/P/P/	UPDGETT/P/P/P/
LISTBIN/M/U/U/	REDECK /M/U/U/	UPDREPL/P/P/P/

R1 FORMAL LOGIC

COUPLE /S/N/N/		

R3 LIST AND STRING PROCESSING

PROSE /M/ /R/	SNOBOL /M/ /R/	

R4 TEXT EDITING

EDITOR /M/ /R/	NETED /M/ /*/	RNF /M/ /*/

S0 INFORMATION RETRIEVAL

ACCTRPT/M/ /R/	EXECARD/M/U/U/	PURPOSE/P/P/P/
ADPCOST/M/ /R/	GETDOC /M/U/U/	QQ /M/ /R/
AUDIT /P/P/P/	GETREV /M/U/U/	QU /M/ /R/
AUDPFT /M/U/U/	IDID /S/5/N/	RIQS /M/ /R/
AUDSORT/M/U/U/	JOBORG /S/5/N/	SHARP /M/ /R/
CCNOTE /P/P/P/	MANUAL /M/U/U/	S2K260 /M/ /R/
DBUTIL /M/ /R/	MSAUDIT/P/P/P/	S2K280 /M/ /R/
DDL /M/ /R/	PAGEPRT/M/U/U/	TAPLIST/M/U/U/
DMS170 /M/ /R/	PROMNT /M/U/U/	VENUS /P/P/P/
DOCDAT /M/U/U/	PURPOS /M/U/U/	
DOCUMNT/M/U/U/	PURPOSE/M/U/U/	

T4 ENGINEERING

ABAQUS /M/ /R/	ECAP /M/ /R/	STRESS /M/ /R/
ARDCFT /S/N/*/	ELBOW /M/ /R/	
CIVCO /M/ /R/	NASTRAN/M/ /R/	

T6 MANUFACTURING (NON-DATA) PROCESSING AND PROCESS CONTROL

APT /M/ /R/		

V1 RANDOM NUMBER GENERATORS

EXRAND /S/M/ /	PORAND /S/M/ /	RN2 /S/N/*/
IRAND /S/M/ /	RAND /S/M/ /	URAND /S/M/ /
NRAND /S/M/ /	RANNUM /S/N/*/	XIRAND /S/M/ /
NRML /S/M/ /	RNDMIZ /S/N/N/	
NRMNO /S/M/ /	RN1 /S/N/*/	

V3 STANDARD AND SPECIAL PROBLEMS

BRAILLE/M/U/U/		

X5 ANALYSIS (TIME-SERIES ANALYSIS)

BMDP1L /M/B/ /	BMDP2T /M/B/ /	SPECTRA/D/S/ /
BMDP2L /M/B/ /	BOXJENK/M/ /R/	SURVIVA/D/S/ /

Z0 ALL OTHERS

ALARM	/M/U/U/	MF2CPU	/S/5/N/	SSP	/S/ /R/
DAYONOF	/S/N/N/	PASCLIB	/S/T/R/		
MF2CPU	/S/N/N/	PTOOLS	/M/T/R/		

***** PROGRAMS *****

THE COMPUTER CENTER CURRENTLY MAINTAINS THREE LIBRARIES OF MAIN PROGRAMS IN ABSOLUTE FORM:

1) BIMEDP - SOME OF THE BIO-MEDICAL STATISTICAL PROGRAMS (P-SERIES)
2) MNSRDC - LOCALLY WRITTEN AND/OR SUPPORTED SCIENTIFIC PROGRAMS
3) UTILITY - LOCALLY WRITTEN AND/OR SUPPORTED UTILITIES

THERE ARE ALSO SOME MAIN PROGRAMS, INCLUDING SPSS AND CVT360, WHICH ARE MAINTAINED IN SEPARATE FILES.

*** BIMEDP *** (PROPRIETARY)

THE BIMEDP-82 BIO-MEDICAL STATISTICAL PROGRAMS P-SERIES FROM UCLA ACCEPT DATA WITH PARAMETER LANGUAGE CONTROL SIMILAR TO SPSS. IT REPLACES ALL PREVIOUS VERSIONS OF BIMED. MOST PROGRAMS WILL RUN IN CM120000. THIS IS THE CDC FTN5 VERSION, WHICH IS MAINTAINED BY NORTHWESTERN UNIVERSITY.

REFERENCE: "BMDP STATISTICAL SOFTWARE 1983 (OR 1981)", W. J. DIXON, EDITOR, UNIVERSITY OF CALIFORNIA PRESS, BERKELEY.

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BEGIN,DOCGET,,BMDP,,BMDP82,OUTPUT,MSACCES=<PW>.
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(20 PAGES REQUIRED READING)

BIMEDP ROUTINES ARE AVAILABLE ON THE MASS STORAGE SYSTEM AND CURRENTLY INCLUDE:

BMDP1D	SIMPLE DATA DESCRIPTION
BMDP2D	FREQUENCY COUNT ROUTINE
BMDP3D	T TEST AND T-SQUARED ROUTINE
BMDP4D	ALPHANUMERIC FREQUENCY COUNT ROUTINE
BMDP5D	UNIVARIATE PLOTTING
BMDP6D	BIVARIATE PLOTTING
BMDP7D	DESCRIPTION OF STRATA WITH HISTOGRAMS AND ANALYSIS OF VARIANCE
BMDP8D	MISSING VALUE CORRELATION
BMDP9D	MULTIDIMENSIONAL DATA DESCRIPTION
BMDPAM	DESCRIPTION AND ESTIMATION OF MISSING DATA

BMDP1F	TWO-WAY FREQUENCY TABLES - MEASURES OF ASSOCIATION
BMDP2F	TWO-WAY FREQUENCY TABLES - EMPTY CELLS AND DEPARTURES FROM INDEPENDENCE
BMDP3F	MULTIWAY FREQUENCY TABLES - LOG-LINEAR MODEL
BMDP4F	FREQUENCY TABLES - REPLACES BMDP1F, BMDP2F, BMDP3F
BMDP1L	LIFE TABLES AND SURVIVAL FUNCTION
BMDP2L	REGRESSION WITH INCOMPLETE SURVIVAL DATA
BMDP1M	CLUSTER ANALYSIS ON VARIABLES
BMDP2M	CLUSTER ANALYSIS ON CASES
BMDP3M	BLOCK CLUSTERING (SEE BMDQ3M)
BMDP4M	FACTOR ANALYSIS
BMDP6M	CANONICAL CORRELATION ANALYSIS
BMDP7M	STEPWISE DISCRIMINANT ANALYSIS
BMDP8M	BOOLEAN FACTOR ANALYSIS
BMDP9M	SCORING BASED ON PREFERENCE PAIRS
BMDPKM	K-MEANS CLUSTERING OF CASES
BMDQ3M	BLOCK CLUSTERING BY IMPROVED METHOD
BMDP1R	MULTIPLE LINEAR REGRESSION
BMDP2R	STEPWISE REGRESSION
BMDP3R	NONLINEAR REGRESSION
BMDP4R	REGRESSION ON PRINCIPAL COMPONENTS
BMDP5R	POLYNOMIAL REGRESSION
BMDP6R	PARTIAL CORRELATION AND MULTIVARIATE REGRESSION
BMDP9R	ALL POSSIBLE SUBSETS REGRESSION
BMDPAR	DERIVATIVE-FREE NONLINEAR REGRESSION
BMDPLR	STEPWISE LOGISTIC REGRESSION
BMDP1S	MULTIPASS TRANSFORMATION
BMDP3S	NONPARAMETRIC STATISTICS
BMDP1T	UNIVARIATE AND BIVARIATE SPECTRAL ANALYSIS
BMDP2T	BOX-JENKENS TIME SERIES ANALYSIS
BMDP1V	ONE-WAY ANALYSIS OF VARIANCE AND COVARIANCE
BMDP2V	ANALYSIS OF VARIANCE AND COVARIANCE, INCLUDING REPEATED MEASURES
BMDP3V	GENERAL MIXED MODEL ANALYSIS OF VARIANCE
BMDP4V	GENERAL UNIVARIATE AND MULTIVARIATE WEIGHTED ANOVA (UNIVERSITY OF ROCHESTER)
BMDP8V	GENERAL MIXED MODEL ANALYSIS OF VARIANCE EQUAL CELL SIZES

TO USE:
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MSACCES,PASSWORD.
MSFETCH,BMDPXX,UN=CSYS.
BMDPXX,....
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*** MNSRDC ***

THE COMPUTER CENTER MAINTAINS SOME LOCALLY WRITTEN AND/OR SUPPORTED SCIENTIFIC PROGRAMS IN THE PUBLIC ACCESS LIBRARY CALLED 'MNSRDC'. PROGRAMS IN THE LIBRARY MAY BE EXECUTED IN ONE OF THE FOLLOWING WAYS:

A) ATTACH,MNSRDC.
LIBRARY,MNSRDC. OR LDSET,LIB=MNSRDC.
PROG,<PARAMETERS>. WHERE PROG IS THE DESIRED PROGRAM

B) BEGIN,MNSRDC,,PROG,<PARAMETERS>.

REFERENCE: CLIB/M. BECAUSE THERE ONLY TWO ROUTINES IN MNSRDC, ONLY A COMPUTER COPY OF THE MANUAL IS AVAILABLE. WHEN THERE IS A SUFFICIENT NUMBER OF ROUTINES IN MNSRDC, CLIB/M WILL BE PUBLISHED FORMALLY. ADDITIONS TO THE LIBRARY ARE WELCOME.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

LIBRARY 'MNSRDC' CONTAINS THE FOLLOWING PROGRAMS:

PLRG	POLYNOMIAL REGRESSION (IBM SSP SAMPLE PROGRAM MODIFIED)
POLYMUL	ROOTS OF A POLYNOMIAL WITH COMPLEX COEFFICIENTS BY MULLER'S METHOD

*** SPSS ***

STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES (SPSS) IS AN OPEN-ENDED INTEGRATED SYSTEM OF STATISTICAL PROGRAMS EMBEDDED IN A SINGLE CONTROL PROGRAM. THE CDC CYBER VERSION WAS OBTAINED FROM NORTHWESTERN UNIVERSITY.
SPSS IS A BATCH SYSTEM WRITTEN MOSTLY IN FORTRAN. THIS PACKAGE (VERSION 9) IS MORE VERSATILE THAN THE BIMEDP ROUTINES (PAGE 2-1), SINCE MANY DIFFERENT STATISTICS CAN BE PERFORMED ON THE SAME DATA IN ONE RUN.

REFERENCES: "SPSS, COMBINED EDITION", NIE, HULL, MCGRAW-HILL, INC., 1981 (ISBN07-079052-3) (INCLUDES 2ND ED. AND 7-9 UPDATE)
"SPSS PRIMER", KLECKA, NIE AND HULL, MCGRAW-HILL, 1975.
NOTE: THE XSPSS BOOKS DO NOT DESCRIBE OUR SYSTEM.

THE FOLLOWING DOCUMENTS MAY BE PRINTED:
BEGIN,DOCGET,,SPSS,,<DOC>,OUTPUT,MSACCES=<PASSWORD>.

WHERE <DOC> IS SPSSGEN - DOCUMENT 187 (15 PAGES) GENERAL DISCRIPTION
SPSSV90 - DOCUMENT 457B (93 PAGES) CDC UPDATE
VER90 - DOCUMENT 86 (4-PAGE SUMMARY)
XREF90 - DOCUMENT 508 (6 PAGES) (CROSS REFERENCE TO OTHER SPSS DOCUMENTATION)
ERRPT90 - SUMMARY OF REPORTED PROBLEMS (48 PAGES)
JFACTOR - DOCUMENT 412
MANOVA - DOCUMENT 588 (91 PAGES)
SUMTABL - DOCUMENT 411

'SPSS' CONTAINS THE FOLLOWING DATA-CARD-CALLABLE PROCEDURES:

AGGREGATE	DESCRIPTIVE GROUP STATISTICS FOR SPECIFIED VARIABLES WRITTEN TO RAW OUTPUT FILE
ANOVA	ONE- TO FIVE-WAY ANALYSIS OF VARIANCE AND COVARIANCE FOR FACTORIAL DESIGNS
BOX-JENKINS	ANALYSIS OF UNIVARIATE TIME SERIES; CAN IDENTIFY, FIT, AND FORECAST TIME SERIES DATA.
BREAKDOWN	DESCRIPTIVE STATISTICS ON SUBGROUPS
CANCORR	CANONICAL CORRELATION ANALYSIS AND TESTS OF STATISTICAL SIGNIFICANCE
CONDESCRIPTIVE	DESCRIPTIVE STATISTICS FOR CONTINUOUS (UNGROUPED) VARIABLES
CROSSTABS	2-WAY TO N-WAY JOINT FREQUENCY DISTRIBUTION, CONTINGENCY TABLES AND RELATED MEASURES OF ASSOCIATION
DISCRIMINANT	MULTIPLE DISCRIMINANT ANALYSIS IN STEPWISE OR DIRECT MODE
FACTOR	FACTOR ANALYSIS BY ONE OF FIVE DIFFERENT METHODS

FREQUENCIES	ONE-WAY FREQUENCY DISTRIBUTIONS WITH DESCRIPTIVE STATISTICS
GUTTMAN	UP TO 50 SEPARATE GUTTMAN SCALES BY VARIANT OF GOOD ENOUGH TECHNIQUE
G3SLS	GENERALIZED AND 3-STAGE LEAST SQUARES ESTIMATES OF THE PARAMETERS OF A SYSTEM OF SIMULTANEOUS STOCHASTIC EQUATIONS
JFACTOR	JORESKOG FACTOR ANALYSIS FOR GENERALIZED LEAST SQUARES, MAXIMUM LIKELIHOOD, AND UNWEIGHTED LEAST SQUARES
MANOVA	MULTIVARIATE ANALYSIS OF VARIANCE AND COVARIANCE WITH UNEQUAL CELL FREQUENCIES
MULT RESPONSE	FREQUENCY AND CROSSTABULATION TABLES FOR MULTIPLE RESPONSE VARIABLES
NONLINEAR	NONLINEAR REGRESSION BY MINIMIZING SUMS OF SQUARES
NONPAR CORR	SPEARMAN AND/OR KENDALL RANK-ORDER CORRELATION COEFFICIENTS AND LEVEL OF SIGNIFICANCE
NPAR TESTS	13 NONPARAMETRIC STATISTICAL TESTS
ONEWAY	ONE-WAY ANALYSIS OF VARIANCE WITH RANGE TESTS
PARTIAL CORR	UP TO 25 SETS OF PARTIAL CORRELATIONS OF ANY ORDER OR COMBINATION - LEAST SQUARES REGRESSION IN MULTIPLE OR STEPWISE MODE
PEARSON CORR	PEARSON PRODUCT-MOMENT (ZERO-LEVEL) CORRELATION COEFFICIENTS AND LEVEL OF SIGNIFICANCE
PLOT	BIVARIATE PLOTS FOR CALCOMP
REGRESSION	MULTIPLE REGRESSION ANALYSIS BY FORWARD INCLUSION, BACKWARD ELIMINATION OR STEPWISE SOLUTION METHOD
RELIABILITY	COEFFICIENTS OF RELIABILITY AND OTHER SUMMARY STATISTICS FOR EVALUATING MULTIPLE ITEM SCALES
REPORT	FLEXIBLE REPORT GENERATOR WITH SUMMARY AND COMPOSITE STATISTICS
SCATTERGRAM	SCATTER DIAGRAM OF DATA POINTS AND SIMPLE REGRESSION
SPECTRAL	SPECTRAL ANALYSIS USING FOURIER METHODS TO REPRESENT A TIME SERIES
SUMMARY TABLES	TABLES (PERCENTAGES AND OPTIONAL CELL COUNTS) WHICH SUMMARIZE RELATIONSHIPS BETWEEN INDEPENDENT VARIABLE AND A NUMBER OF DICHOTOMOUS DEPENDENT VARIABLES

SURVIVAL	SURVIVAL ANALYSIS AND LIFE EXPECTANCIES - EVALUATE TIME INTERVAL BETWEEN STARTING AND TERMINAL EVENTS
TETRACHORIC	TETRACHORIC CORRELATION COEFFICIENTS BETWEEN DICHOTOMOUS VARIABLES
T-TEST	STUDENT'S T AND PROBABILITY LEVELS TESTS ON SAMPLE MEANS

*** UTILITY ***

THE COMPUTER CENTER MAINTAINS SOME LOCALLY WRITTEN AND/OR SUPPORTED UTILITIES IN THE PUBLIC ACCESS LIBRARY CALLED 'UTILITY'. PROGRAMS IN THIS LIBRARY MAY BE EXECUTED IN ONE OF THE FOLLOWING WAYS:

A) ATTACH,UTILITY.
LIBRARY,UTILITY. OR LDSET,LIB=UTILITY.
PROG,<PARAMETERS>. WHERE PROG IS THE DESIRED PROGRAM

B) BEGIN,UTILITY,,PROG,<PARAMETERS>.

REFERENCES: ALL OF THESE PROGRAMS ARE DOCUMENTED IN CLIB/U, WHICH MAY BE OBTAINED FROM USER SERVICES.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

LIBRARY 'UTILITY' CONTAINS THE FOLLOWING PROGRAMS:

ADDECK	ADD *DECK RECORDS IN FRONT OF EACH DOCUMENT IN A DOCUMENT FILE
ALARM	SOUND BELL 20 TIMES AT INTERACTIVE TERMINAL
ASCDC	CONVERT 7-BIT ASCII FILE TO 6-BIT CDC AND VICE VERSA
AUDPFT	PRODUCE MINI-AUDIT OF USER PFDUMP TAPES CREATED BY SELDUMP OR PRIVATE PACK PFDUMP
AUDSORT	SORT OUTPUT FROM USER AUDIT
BANNER	PRINT A BANNER (PAGE)
BANNERS	PRINT 1 TO 8 BANNERS ON ONE PAGE
BANNER3	PRINT 3 BANNERS ON ONE PAGE
BANNER6	PRINT 3-6 BANNERS ON ONE PAGE
BINDEX	GIVE LIST AND SORTED LIST OF OUTPUT OF EDITLIB 'LISTLIB' AND 'CONTENT' DIRECTIVES
BRAILLE	BRAILLE PRINTER
CALCIBL	CALCULATE BEST BLOCK LENGTHS (I.E. - MIN TIME REQUIRED FOR RANDOM ACCESS AND MINIMUM BUFFER SIZE) FOR INDEX SEQUENTIAL FILE
CARDS	REPRODUCE A BCD DECK WITH MODIFICATONS. (FIELDS MAY BE MOVED, DELETED, INTERCHANGED, GANG PUNCHED AND/OR SEQUENCED)
CARDS2	REPRODUCE A BCD DECK WITH MODIFICATIONS. (FIELDS MAY BE COPIED, MOVED, DELETED, INTERCHANGED, GANG PUNCHED AND/OR SEQUENCED.)

CBLFMT	REFORMAT A COBOL SOURCE PROGRAM TO ENHANCE ITS READABILITY, THEREBY MAKING IT EASIER TO UNDERSTAND AND MODIFY
COMPAR	COMPARE TWO TEXT FILES AND REPORT ANY DIFFERENCES
COPYEXT	COPY UNIT RECORDS (ZERO BYTE TERMINATED) EXTRACTING SPECIFIED COLUMNS AND OPTIONALLY MOVING THEM AND OPTIONALLY ADD EDITOR SEQUENCING
COPYLIB	FROM AN EDITLIB LISTLIB LISTING, CREATE SORTED (OR UNSORTED) DIRECTIVES TO COPY AN EDITLIB USER LIBRARY
COPYRE	COPY AND REARRANGE FILE OF ZERO BYTE TERMINATED RECORDS (150 CHARACTERS MAXIMUM PER RECORD)
COPYS	A GENERAL PURPOSE UTILITY FROM NORTHWESTERN UNIVERSITY WHICH PROVIDES A LARGE VARIETY OF COPY OPERATIONS FOR SEQUENTIAL OR RANDOM FILES (4)
COPYSEL	COPY AND REARRANGE FILE OF ZERO BYTE TERMINATED RECORDS (150 CHARACTERS MAXIMUM PER RECORD; FILE PROCESSED DIRECTLY)
COUNTLR	COUNT LOGICAL RECORDS IN A FILE
CV029	CONVERT TO 029 PUNCH CODE
C2D	CONVERT COMMENTS INTO DOCUMENTATION
DECKS	LIST UPDATE 'SOURCE' FILE DECK/COMDECK NAMES, SEQUENCE NUMBER AND NUMBER OF CARDS AND, OPTIONALLY (FOR DOCUMENT FILES), NUMBER OF LINES AND NUMBER OF PAGES
DEKSORT	SORT IDENT AND DECK LISTINGS FROM UPDATE OUTPUT FILE
DFDATIM	PUT DATE/TIME INTO DAYFILE
DMPFIL	DUMP FIRST N WORDS OF EACH LOGICAL RECORD IN M FILES
DOCDAT	LIST DOCUMENT NAMES, DATES AND PAGE NUMBERS
DOCIT	ADD PAGING TO ONE OR MORE DOCUMENTS
DOCS	CREATE DOCUMENTATION FOR (SUB)PROGRAMS, PROCEDURES, LIBRARIES, MAGNETIC TAPES, AND PERMANENT FILES
DOCUMNT	MAINTAIN A FILE OF DOCUMENTS
DUMPOBJ	DUMP A BINARY FILE (ABSOLUTE OR RELOCATABLE), EXPANDING ALL LOADER TABLES
D2C	CONVERT DOCUMENT TO FORTRAN, COBOL, OR COMPASS COMMENTS
EOFAD	ADD OR DELETE EOF'S TO/FROM A FILE (THRU EOI)

EOI POSITION A FILE AT END-OF-INFORMATION (EOI)

EXECARD EXTRACT EXECUTE CARD PARAMETER/SUBPROGRAM USAGE/PROCEDURE USAGE INFORMATION FROM DOCUMENTATION FILES (WHICH WERE PREPARED IN THE FORMAT GENERATED BY PROGRAM 'DOC')

FDMP INTERPRETTED MEMORY DUMP

FRAME PRINT A FRAME FOR LINING UP PRINTOUTS

GETDOC EXTRACT (PRINT) ONE OR MORE COPIES OF ONE OR MORE DOCUMENTS FROM A DOCUMENT FILE

GETOBJ EXTRACT ONE OBJECT MODULE FROM A SEQUENTIAL OBJECT FILE OR AN EDITLIB USER LIBRARY

GETREV EXTRACT ALL PAGES FROM A MANUAL WHICH WERE MODIFIED AFTER USER-SPECIFIED DATE

HEXDMP SEE TAPDMP9

JOBTIME PUT JOB CP EXECUTION TIME TO THIS POINT INTO DAYFILE

LINER COUNT LINES AND PAGES OF A FILE HAVING FIRST CHARACTER CARRIAGE CONTROL

LINERL LIST A DOCUMENT (CARRIAGE CONTROL IN COLUMN 1, ZERO BYTE TERMINATED RECORDS) WITH RECORD COUNT AND COUNT OF LINES ON EACH PAGE. LIST THRU END-OF-INFORMATION.

LISTBIN LIST BINARY MODULES AND PROCEDURES IN ONE OR MORE FILES

LISTCMP LIST AN UPDATE COMPILE FILE, EACH DECK BEGINNING ON A NEW PAGE WITH A BANNER PAGE PRECEDING IT

LISTEOI LIST A FILE INSERTING *EOR, *EOF, *EOI WHERE APPROPRIATE

LISTER MULTI-OPTION LISTING PROGRAM

LISTM LIST IN MULTIPLE COLUMNE

LISTN NUMBERED LIST OF ONE FILE OF ZERO-BYTE TERMINATED RECORDS

LISTZ LIST ZERO-BYTE TERMINATED RECORDS WITH RECORD NUMBER AND LENGTHS (USER MAY SPECIFY MAXIMUM NUMBER OF CHARACTERS TO READ (DEFAULT: 140) AND PRINT (DEFAULT: 110)

LIST1 LIST (CENTERED) ONE COPY OF A FORM (UP TO 90 CHARACTERS PER LINE AND HAVING CARRIAGE CONTROL IN COLUMN 1). OPTIONALLY PRINT RECORD-IN-FILE, PAGE AND LINE-ON-PAGE COUNTS AND LINE LENGTHS.

LIST2	SINGLE/DOUBLE SPACE LISTING, 6 OR 8 LINES PER INCH, WITH OPTIONAL SKIP OVER PERFORATION AT BOTTOM OF PAGE (FIRST 120 CHARACTERS)
LIST3	LIST FIRST (UP TO 90-CHARACTER, ZERO BYTE TERMINATED) RECORD IN EACH LOGICAL RECORD THROUGH EOI
LIST4	LIST UNIT RECORDS, THRU EOI, WHICH HAVE '1' IN COLUMN 1
LMFNPFN	LIST EXECUTING USER'S TABLE/MFNPFN WITH LINE COUNTS
LONGEST	FIND THE LENGTH OF THE LONGEST LINE IN A FILE
LPL	LIST PAGE LENGTHS IN A DOCUMENT (LONG PAGES AND LONG LINES CAN BE FLAGGED)
LPLM	LIST PAGE LENGTHS IN A MANUAL (LONG PAGES AND LONG LINES CAN BE FLAGGED)
MAKSUB	GENERATE A SKELETON SUBPROGRAM
MANUAL	EXTRACT REVISION PAGES FROM A MANUAL (CCRM OR CCBRM)
MFNS	EXTRACT USER INITIALS AND MSS FILE NAMES FROM MSAUDIT
MF2MFA	USING PARTIAL AUDIT OUTPUT, GENERATE PROCEDURES TO MOVE ALL FILES FROM ONE MAINFRAME TO ANOTHER VIS THE MSS
MSAUD	SORT LO=F OUTPUT FROM MSAUDIT
MSAUFP1	FROM MSAUDIT,LO=F OUTPUT, GENERATE A PROCEDURE TO DO AN MSAUDIT,LO=FP FOR EACH SEMI-PRIVATE MSS FILE AND A SEPARATE FILE OF THE SEMI-PRIVATE FILENAMES FOR PROGRAM MSAUFP2
MSAUFP2	FROM MSAUDIT,LO=FP OUTPUT OF PROCEDURE GENERATED BY PROGRAM MSAUFP1 AND OUTPUT OR PROGRAM MSAUFP1, MAKE LIST OF ACCESS TO MSS SEMI-PRIVATE FILES
MSNEWAC	BASED ON MSAUDIT,LO=F, GENERATE A PROCEDURE TO RENAME THE AC PARAMETER FOR MASS STORAGE SYSTEM FILES
MSTBL	GENERATE TABLE/MFNPFN INTERACTIVELY FOR MSS
NEWNAME	RENAME A SIMPLE ABSOLUTE MODULE
PFNEWAC	RENAME CATALOGED ACCOUNT NUMBER. USE WHEN ALL FILES CATALOGED UNDER A GIVEN JOB ORDER NUMBER ARE TO BE CHANGED TO ANOTHER JOB ORDER NUMBER.
PROMNT	MAINTAIN AN ALPHABETICAL, SEQUENTIAL PROCEDURE FILE, EACH PROCEDURE BEING ONE NOS/BE LOGICAL RECORD. BOTH CCL AND B/R PROCEDURES ARE SUPPORTED.
PRUDMP	OCTAL AND CHARACTER DUMP OF DISK FILE BY RELATIVE PRU NUMBER

PR2UP THIS PROGRAM IS INTENDED TO REFORMAT A SINGLE-COLUMN TEXT FILE COMPOSED OF 60-CHARACTER LINES INTO A 2-UP (DOUBLE-COLUMN) FORMAT HAVING MAXIMUM TOTAL LINE LENGTH OF 132 PRINTABLE CHARACTERS (PLUS 1 POS FOR CARRIAGE CONTROL). THE OUTPUT WILL BE SUITABLE FOR PRINTING EITHER ON A LINE PRINTER OR ON XEROX-1200 8-1/2 X 11 PAPER.

PTIM PRINT CPA, CPB, CPA+CPB, IO AND PP TIMES SINCE START OF JOB OR INTERCOM SESSION

PURPOS EXTRACT PURPOSE INFORMATION FROM DOCUMENT FILES (WHICH WERE PREPARED IN THE FORMAT GENERATED BY PROGRAM 'DOCS')

PURPOSE EXTRACT PURPOSE INFORMATION FROM DOCUMENTATION FILES (WHICH WERE PREPARED IN THE FORMAT GENERATED BY PROGRAM 'DOCS')

REDECK CHANGE AN UPDATE COMPILE FILE BACK INTO A SOURCE FILE

RENMID CONVERT AI=S AUDIT INTO A PROCEDURE TO RENAME THE ID ON EACH FILE IN THE AUDIT BY COPYING THE FILE

RSTORPF CREATE A FILE OF DIRECTIVES TO BE USED TO RESTORE PERMANENT FILES

SORTUP GENERATE UPDATE DIRECTIVES TO SORT OLDPL

S2KRNM RENAME ACCOUNT NUMBER ON CATALOGED S2000 DATA BASE FILES

TAPDMP9 DUMP 9-TRACK TAPE IN HEXADECIMAL (AND CHARACTER, IF ASCII OR EBCDIC) OR OCTAL-AND-CHARACTER (IF BCD OR DISPLAY CODE)

TAPLIST PREPARE TWO LISTS FROM MAGTAPEDOCUMENTATION FILE: 1) LIST OF TAPE NUMBER, LABEL, DENSITY, REMARKS AND DESCRIPTION FOR EACH TAPE DOCUMENTED IN FILE 2) LIST OF TAPE NUMBERS AND LABELS

TIDY RENUMBER AND EDIT FORTRAN SOURCE PROGRAMS

UNDOCIT REMOVE THE PAGING WHICH WAS ADDED TO DOCUMENT(S) BY PROGRAM 'DOCIT'

VAXER COPY VAX CONTINUOUS DATA TO 5040 CHARACTER BLOCKS FOR XEROX

WHATLIB LIST LIBRARIES SPECIFIED ON LAST LIBRARY CARD

WHICHMF TELL INTERACTIVE USER OR BATCH JOB WHICH MAINFRAME IS BEING USED

WHICHOS TELL INTERACTIVE USER OR BATCH JOB WHICH OPERATING SYSTEM IS BEING USED

XDOC EXTRACT ALL DOCUMENTS FROM A DOCUMENT FILE (HAVING *DECK'S) PREPARING THE OUTPUT FOR THE XEROX 8700 TO START EACH DOCUMENT ON A NEW PAGE

XFRC2M CREATE PROCEDURE TO TRANSFER ONE CDC PERMANENT FILE TO MASS STORAGE FOR THE EXECUTING USER (CDC PFN OBTAINED FROM USER'S FILE TABLE/MFNPFN)

XFRC2MA CREATE PROCEDURE TO TRANSFER ALL CDC PERMANENT FILES OF EXECUTING USER TO MASS STORAGE (BASED ON USER'S CDC FILE TABLE/MFNPFN)

XFRM2C CREATE PROCEDURE TO TRANSFER ONE MSS FILE TO A CDC PERMANENT FILE (BASED ON EXECUTING USER'S FILE TABLE/MFNPFN)

XFRM2CA CREATE PROCEDURE TO TRANSFER ALL MSS FILES OF EXECUTING USER TO A CDC PERMANENT FILE (BASED ON EXECUTING USER'S FILE TABLE/MFNPFN)

*** PROGRAMS NOT IN LIBRARIES ***

SEVERAL PROGRAMS WHICH ARE NOT IN LIBRARIES ARE LISTED BELOW. (SEE THEIR INDIVIDUAL DOCUMENTS FOR ATTACH AND EXECUTE INFORMATION.)

IF THE LENGTH OF A DOCUMENT IS GIVEN IN PARENTHESES FOLLOWING THE DESCRIPTION, THE INDIVIDUAL DOCUMENT MAY BE PRINTED BY:

BEGIN,DOCGET,,OTHER,,<PROG>,OUTPUT,MSACCES=<PASSWORD>.

WHERE <PROG> IS THE NAME OF THE PROGRAM WHOSE DOCUMENTATION IS DESIRED.

ABAQUS	A FAMILY OF MODELLING CAPABILITIES BASED ON THE FINITE ELEMENT METHOD FOR NON-LINEAR STRUCTURAL PROBLEMS
ACCTRPT	PROVIDE JOB ORDER MANAGER WITH COMPUTER ACCOUNTING STATUS INFORMATION (3)
ADPCOST	PROVIDE JOB ORDER MANAGER WITH COMPUTER ACCOUNTING STATUS INFORMATION (2)
APL	A PROGRAMMING LANGUAGE
APT	AUTOMATICALLY PROGRAMMED TOOLS - PREPARE PUNCHED PAPER TAPES FOR NUMERICALLY CONTROLLED MACHINE TOOLS
CCL	CYBER CONTROL LANGUAGE REFERENCE GUIDE (39)
COPYBFR	RE-CREATE A CDC 'RANDOM' FILE FROM DATA COPIED EARLIER TO A SEQUENTIAL FILE, OR COPY A RANDOM FILE (2)
COPYE	COPY A FILE TO END-OF-INFORMATION (2)
COPYF	COPY BINARY OR CODED FILES (2)
COPYR	COPY BINARY OR CODED RECORDS (2)
COPYRM	COPY AND CONVERT RECORDS ON SEQUENTIAL (SQ) FILES FROM ONE RECORD TYPE AND BLOCK STRUCTURE TO ANOTHER (3)
COPYSF	COPY FILES OR RECORDS WITH OPTIONAL SHIFT TO RIGHT (3)
CVT360	CONVERT DOUBLE PRECISION S/360 FORTRAN PROGRAMS TO SINGLE PRECISION CDC FORTRAN (1)
EZGR	TEKTRONIX PLOT10 EASY GRAPHING SOFTWARE PACKAGE FOR 4027 COLOR GRAPHICS TERMINALS
IDDS	PREPARE/EXAMINE GRAPHICALLY NUMERICAL DATA INPUT TO OR OUTPUT FROM A FORTRAN PROGRAM (SEE PAGE 4-3)
GPSS	GENERAL PURPOSE SIMULATION SYSTEM V

MIMIC A DIGITAL/ANALOG SIMULAATION LANGUAGE OF SOLVING SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS

MNF MINNESOTA FORTRAN (MNF) IS AN ALTERNATIVE COMPILER WHICH HAS VERY GOOD DIAGNOSTICS

NASTRAN A GENERAL PURPOSE FINITE ELEMENT STRUCTURAL ANALYSIS PROGRAM

NETED TEXT EDITOR (MODELLED AFTER THE STANDARD ARPANET EDITOR) (25)

OMNITAB ENABLES THE NON-PROGRAMMER TO PERFORM DATA, STATISTICAL AND NUMERICAL ANALYSIS

PLI A SUBSET OF ANSI PL/I

PROSE A TEXT PROCESSOR (31)

PURGALL PURGE (ALL OF) THE FILES OF SPECIFIED AC AND ID (2)

RATFOR CONVERT RATIONAL FORTRAN TEXT INTO CDC FTN TEXT (12)

RNF TEXT PROCESSOR (45)

SHARP SHIP ANALYSIS AND RETRIEVAL PROGRAM - A GENERALIZED DATA BASE MANAGEMENT SYSTEM

SIMSCRIPT II.5
A GENERAL PURPOSE SIMULATION LANGUAGE AND A DISCRETE EVENT SIMULATOR

SNOBOL SNOBOL4 - VERSION 3.10 - USER'S GUIDE (37)

SYSTEM 2000
A DATA BASE MANAGEMENT SYSTEM

WRITE CHARACTER CONVERSION FOR DOCUMENTS CREATED BY PROSE (10)

** PASCAL **

DOCUMENTS DESCRIBING THE PASCAL 6000 VERSION 3 SYSTEM MAY BE PRINTED BY:

BEGIN,DOCGET,,PASCAL,,<DOC>,OUTPUT,MSACCES=<PASSWORD>.

WHERE <DOC> IS:

PASCAL PASCAL 6000 COMPILER RELEASE 3 (92)

PASCLIB PASCAL LIBRARIES (COMPILE-TIME: PSRCLIB; RUN-TIME: PASCLIB) (77)

PTOOLS SEVEN DOCUMENTS DESCRIBING EIGHT TOOLS FOR PASCAL PROGRAMS (34)

***** SUBPROGRAMS *****

THE COMPUTER CENTER MAINTAINS SEVERAL LIBRARIES OF SUBPROGRAMS IN RELOCATABLE OBJECT FORM. THIS CHAPTER DESCRIBES THE FOLLOWING LIBRARIES AND LISTS THE CONTENTS OF EACH WITH DESCRIPTIVE TITLES (REFERENCES ARE GIVEN FOR THE WRITE-UPS):

- ARLNALG - AEROSPACE RESEARCH LABORATORIES LINEAR ALGEBRA LIBRARY
- EISPACK - SOLVE EIGENVALUE AND EIGENVECTOR PROBLEMS
- FUNPACK - SPECIAL FUNCTIONAL SUBROUTINE PACKAGE FROM ARGONNE NATIONAL LABORATORY
- IMSL - INTERNATIONAL MATHEMATICAL AND STATISTICAL LIBRARIES PACKAGE
- LINPACK - SOLVE SYSTEMS OF SIMULTANEOUS LINEAR EQUATIONS
- MINPACK - SOLVE NON-LINEAR EQUATIONS AND NON-LINEAR LEAST SQUARES PROBLEMS
- MSL - CDC MATH SCIENCE LIBRARY
- NSRDC - DTNSRDC WRITTEN AND/OR SUPPORTED SCIENTIFIC AND UTILITY SUBROUTINES
- NSRDC5 - DTNSRDC WRITTEN AND/OR SUPPORTED SCIENTIFIC AND UTILITY SUBROUTINES WHICH USE UNIQUE FEATURES OF FORTRAN 77
- SANDIA - ORDINARY DIFFERENTIAL EQUATION SOLVERS FROM SANDIA LABORATORIES

THESE ROUTINES ARE USED PRIMARILY WITH FTN5, FTN4, MNF OR RATFOR PROGRAMS AND MOST ARE CODED IN FORTRAN.

TO ACCESS ANY LIBRARY:

```
ATTACH,<LIB>.
LDSET,LIB=<LIB>.          OR        LIBRARY,<LIB>.
LGO.                      OR OTHER LOAD AND EXECUTE CARD(S)
```

FOR EXAMPLE,

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JOBNAME.
CHARGE,....
FTN5.
ATTACH,NSRDC5.
ATTACH,NSRDC.
LDSET,LIB=NSRDC5/NSRDC.
LGO.
'   7/8/9     EOR
      PROGRAM TEST (INPUT=128, OUTPUT=128)
      ...
      CALL ANOVA1 (...)
      ...
      END
'   7/8/9     EOR
   (DATA CARDS)
"   6/7/8/9   EOI
```

INDIVIDUAL MACHINE-READABLE DOCUMENTS, WHEN AVAILABLE, MAY BE PRINTED (SEE PAGE 1-2).

*** ARLNALG ***

THE AEROSPACE RESEARCH LABORATORIES (ARL) LINEAR ALGEBRA LIBRARY IS A COLLECTION OF 34 SUBROUTINES FOR SOLUTIONS TO LINEAR SYSTEMS AND DETERMINATION OF EIGENVALUES AND EIGENVECTORS OF REAL SYMMETRIC MATRICES. SOME OF THESE ROUTINES ARE SPECIFICALLY OPTIMIZED FOR THE CDC 6000 SERIES COMPUTERS.

REFERENCES: THE ARL LINEAR ALGEBRA LIBRARY HANDBOOK, NIKOLAI AND TSAO, AEROSPACE RESEARCH LABORATORIES, DAYTON, OHIO, JULY 1974, ARL TR 74-0106.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'ARLNALG' INCLUDE:

BAC1	EIGENVECTORS OF A SYMMETRIC MATRIX FROM THOSE OF ITS TRIDIAGONAL FORM
BAC2	EIGENVECTORS OF A SYMMETRIC MATRIX FROM THOSE OF ITS TRIDIAGONAL FORM
BISEC	EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX BY THE BISECTION METHOD
FIP	FAST INNER PRODUCT EVALUATION OPTIMIZED FOR THE CDC 6000
IMPR1	ITERATIVE IMPROVEMENT TO MACHINE ACCURACY OF THE SOLUTION X OF AX = B OBTAINED USING SUBROUTINE LEQS1
IMPR2	ITERATIVE IMPROVEMENT TO MACHINE ACCURACY OF THE SOLUTION X OF AX = B OBTAINED USING SUBROUTINE LEQS2
IMQL1	EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX
INIT	EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX BY INVERSE ITERATION
LEQS1	SOLUTION OF A LINEAR SYSTEM GIVEN A TRIANGULAR FACTORIZATION OF THE COEFFICIENT MATRIX PRODUCED BY LU1
LEQS2	SOLUTION OF A LINEAR SYSTEM GIVEN A TRIANGULAR FACTORIZATION OF THE COEFFICIENT MATRIX PRODUCED BY LU2
LEQS3	SOLUTION OF A LINEAR SYSTEM GIVEN A TRIANGULAR FACTORIZATION OF THE COEFFICIENT MATRIX PRODUCED BY LU3
LEQS4	SOLUTION OF A LINEAR SYSTEM GIVEN A TRIANGULAR FACTORIZATION OF THE COEFFICIENT MATRIX PRODUCED BY LU4
LEQS5	SOLUTION OF A LINEAR SYSTEM GIVEN A TRIANGULAR FACTORIZATION OF THE COEFFICIENT MATRIX PRODUCED BY LU5
LEQS6	SOLUTION OF A LINEAR SYSTEM GIVEN A TRIANGULAR FACTORIZATION OF THE COEFFICIENT MATRIX PRODUCED BY LU6

LU1	LU FACTORIZATION OF A REAL SQUARE MATRIX
LU2	LU FACTORIZATION OF A REAL SQUARE MATRIX BY THE CROUT METHOD WITH ACCUMULATING INNER PRODUCTS
LU3	LU FACTORIZATION OF A REAL SQUARE MATRIX
LU4	LU FACTORIZATION OF A REAL BAND MATRIX A TOGETHER WITH THE NUMBER OF POSITIVE EIGENVALUES IF A IS SYMMETRIC
LU5	CHOLESKY FACTORIZATION OF A POSITIVE DEFINITE REAL SYMMETRIC MATRIX
LU6	CHOLESKY FACTORIZATION OF A POSITIVE DEFINITE REAL SYMMETRIC BAND MATRIX
ORIMP	ITERATIVE IMPROVEMENT OF THE SOLUTION X OF AX = B OBTAINED USING SUBROUTINE ORSOL
ORSOL	LEAST SQUARES SOLUTION OF A LINEAR SYSTEM GIVEN AN ORTHOGONAL-TRIANGULAR FACTORIZATION OF THE COEFFICIENT MATRIX PRODUCED BY SUBROUTINE ORTHO
ORTHO	ORTHOGONAL TRANSFORMATION OF A GIVEN GENERAL M BY N MATRIX A TO UPPER TRIANGULAR FORM
ORTHO2	ORTHOGONAL TRANSFORMATION OF A GENERAL M BY N MATRIX A TO UPPER TRIANGULAR FORM AND THE SOLUTION OF THE ASSOCIATED LINEAR LEAST SQUARES PROBLEM
QZABX	SOLUTION OF THE GENERALIZED MATRIX EIGENVALUE PROBLEM USING THE QZ ALGORITHM
REBAKA	RECOVERY OF EIGENVECTORS OF GENERALIZED SYMMETRIC EIGENVALUE PROBLEM FROM THOSE OF STANDARD FORM PRODUCED BY REDUC1
REDUC1	REDUCTION OF THE GENERALIZED SYMMETRIC EIGENVALUE PROBLEM TO STANDARD FORM
RITZIT	ITERATIVE COMPUTATION OF EIGENVALUES LARGEST IN MAGNITUDE AND CORRESPONDING EIGENVECTORS OF A REAL SYMMETRIC MATRIX
RNQL1	EIGENVALUES OF A REAL SYMMETRIC TRIDIAGONAL MATRIX
SVD	SINGULAR VALUE DECOMPOSITION OF A REAL RECTANGULAR MATRIX
TRI1	FAST HOUSEHOLDER TRIDIAGONAL FORM OF A REAL SYMMETRIC MATRIX
TRI2	COMPACT HOUSEHOLDER TRIDIAGONAL FORM OF A REAL SYMMETRIC MATRIX
TRI3	FAST HOUSEHOLDER TRIDIAGONAL FORM OF A REAL SYMMETRIC MATRIX FOR THE QL ALGORITHM
TRI4	HOUSEHOLDER TRIDIAGONAL FORM OF A REAL SYMMETRIC MATRIX FOR THE QL ALGORITHM

*** EISPACK ***

THE EIGENSYSTEM PACKAGE FROM ARGONNE NATIONAL LABORATORY IS A COLLECTION OF 70 SUBROUTINES TO SOLVE EIGENVECTOR AND EIGENVALUE PROBLEMS. ROUTINES IN THIS PACKAGE ARE OFTEN SUPERIOR IN SPEED AND ACCURACY TO SIMILAR ROUTINES IN OTHER PACKAGES.

REFERENCES: LECTURE NOTES IN COMPUTER SCIENCE, VOLUME 6, "MATRIX EIGENSYSTEM ROUTINES - EISPACK GUIDE", SMITH, ET AL, SPRINGER-VERLAG, BERLIN-HEIDELBERG-NEW YORK, 1974.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'EISPACK' INCLUDE:

BAKVEC BACK TRANSFORM THE EIGENVECTORS OF THAT SYMMETRIC TRIDIAGONAL MATRIX DETERMINED BY FIGI

BALANC BALANCE A REAL GENERAL MATRIX

BALBAK BACK TRANSFORM THE EIGENVECTORS OF THAT REAL MATRIX TRANSFORMED BY BALANC

BANDR REDUCE A REAL SYMMETRIC BAND MATRIX TO A SYMMETRIC TRIDIAGONAL MATRIX USING AND OPTIONALLY ACCUMULATING ORTHOGONAL TRANSFORMATIONS

BANDV DETERMINE SOME EIGENVECTORS OF A REAL SYMMETRIC BAND MATRIX OR SOLVE BAND EQUATIONS

BISECT DETERMINE SOME EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX

BQR DETERMINE SOME EIGENVALUES OF A REAL SYMMETRIC BAND MATRIX

CBABK2 BACK TRANSFORM THE EIGENVECTORS OF THAT COMPLEX MATRIX TRANSFORMED BY CBAL

CBAL BALANCE A COMPLEX GENERAL MATRIX

CG DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX GENERAL MATRIX

CH DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX HERMITIAN MATRIX

CINVIT DETERMINE THOSE EIGENVECTORS OF A COMPLEX UPPER HESSENBERG MATRIX CORRESPONDING TO SPECIFIED EIGENVALUES

COMBAK BACK TRANSFORM THE EIGENVECTORS OF THAT UPPER HESSENBERG MATRIX DETERMINED BY COMHES

COMHES REDUCE A COMPLEX GENERAL MATRIX TO COMPLEX UPPER HESSENBERG FORM USING ELEMENTARY TRANSFORMATIONS

COMLR DETERMINE THE EIGENVALUES OF A COMPLEX UPPER HESSENBERG MATRIX

COMLR2	DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX UPPER HESSENBERG MATRIX
COMQR	DETERMINE THE EIGENVALUES OF A COMPLEX UPPER HESSENBERG MATRIX
COMQR2	DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX HESSENBERG MATRIX
CORTB	BACK TRANSFORM THE EIGENVECTORS OF THAT UPPER HESSENBERG MATRIX DETERMINED BY CORTH
CORTH	REDUCE A COMPLEX GENERAL MATRIX TO UPPER HESSENBERG FORM USING UNITARY TRANSFORMATIONS
ELMBAK	BACK TRANSFORM THE EIGENVECTORS OF THAT UPPER HESSENBERG MATRIX DETERMINED BY ELMHES
ELMHES	REDUCE A REAL GENERAL MATRIX TO UPPER HESSENBERG FORM USING ELEMENTARY TRANSFORMATIONS
ELTRAN	ACCUMULATE THE TRANSFORMATIONS IN THE REDUCTION OF A REAL GENERAL MATRIX BY ELMHES
FIGI	TRANSFORM A CERTAIN REAL NON-SYMMETRIC TRIDIAGONAL MATRIX TO A SYMMETRIC TRIDIAGONAL MATRIX
FIGI2	TRANSFORM A CERTAIN REAL NON-SYMMETRIC TRIDIAGONAL MATRIX TO A SYMMETRIC TRIDIAGONAL MATRIX ACCUMULATING THE DIAGONAL TRANSFORMATIONS
HQR	DETERMINE THE EIGENVALUES OF A REAL UPPER HESSENBERG MATRIX
HQR2	DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A REAL UPPER HESSENBERG MATRIX
HTRIBK	BACK TRANSFORM THE EIGENVECTORS OF THAT SYMMETRIC TRIDIAGONAL MATRIX DETERMINED BY HTRIDI
HTRIB3	BACK TRANSFORM THE EIGENVECTORS OF THAT SYMMETRIC TRIDIAGONAL MATRIX DETERMINED BY HTRID3
HTRIDI	REDUCE A COMPLEX HERMETIAN MATRIX TO A REAL SYMMETRIC TRIDIAGONAL MATRIX USING UNITARY TRANSFORMATIONS
HTRID3	REDUCE A COMPLEX HERMETIAN MATRIX, STORED AS A SINGLE SQUARE ARRAY, TO A REAL SYMMETRIC TRIDIAGONAL MATRIX USING UNITARY TRANSFORMATIONS
IMTQLV	DETERMINE THE EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX
IMTQL1	DETERMINE THE EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX
IMTQL2	DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX
INVIT	DETERMINE THOSE EIGENVECTORS OF A REAL UPPER HESSENBERG MATRIX CORRESPONDING TO SPECIFIED EIGENVALUES

MINFIT COMPUTE THE SINGLUAR VALUE DECOMPOSITION OF AN ARBITRARY REAL RECTANGULAR MATRIX AND THE SOLUTION OF A RELATED LINEAR LEAST SQUARES PROBLEM

ORTBAK BACK TRANSFORM THE EIGENVECTORS OF THAT UPPER HESSENBERG MATRIX DETERMINED BY ORTHES

ORTHES REDUCE A REAL GENERAL MATRIX TO UPPER HESSENBERG FORM USING ORTHOGONAL TRANSFORMATIONS

ORTRAN ACCUMULATE THE TRANSFORMATIONS IN THE REDUCTION OF A REAL GENERAL MATRIX BY ORTHES

QZHES SIMULTANEOUSLY REDUCE ONE OF A PAIR OF REAL GENERAL MATRICES TO UPPER HESSENBERG FORM AND THE OTHER TO UPPER TRIANGULAR FORM USING AND OPTIONALLY ACCUMULATING ORTHOGONAL TRANSFORMATIONS

QZIT REDUCE ONE OF A PAIR OF REAL MATRICES FROM UPPER HESSENBERG TO QUASI-UPPER TRIANGULAR FORM WHILE MAINTAINING THE UPPER TRIANGULAR FORM OF THE OTHER USING AND OPTIONALLY ACCUMULATING ORTHOGONAL TRANSFORMATIONS

QZVAL EXTRACT THE GENERALIZED EIGENVALUES OF A REAL MATRIX SYSTEM WITH ONE MATRIX IN QUASI-UPPER TRIANGULAR FORM AND THE OTHER IN UPPER TRIANGULAR FORM USING AND OPTIONALLY ACCUMULATING ORTHOGONAL TRANSFORMATIONS

QZVEC DETERMINE THE GENERALIZED EIGENVECTORS OF A REAL MATRIX SYSTEM WITH ONE IN QUASI-UPPER TRIDIAGONAL FORM AND THE OTHER IN UPPER TRIANGULAR FORM USING BACK SUBSTITUTION

RATQR DETERMINE SOME EXTREME EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX

REBAKB BACK TRANSFORM THE EIGENVECTORS OF THAT DERIVED SYMMETRIC MATRIX DETERMINED BY REDUC2

REBAK BACK TRANSFORM THE EIGENVECTORS OF THAT DERIVED SYMMETRIC MATRIX DETERMINED BY REDUC OR REDUC2

REDUC REDUCE A CERTAIN GENERALIZED SYMMETRIC EIGENPROBLEM TO THE STANDARD SYMMETRIC EIGENPROBLEM USING CHOLSKY DECOMPOSITION

REDUC2 REDUCE CERTAIN GENERALIZED SYMMETRIC EIGENPROBLEMS TO STANDARD SYMMETRIC EIGENPROBLEMS USING CHOLSKY DECOMPOSITION

RG DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A REAL GENERAL MATRIX

RGG DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS FOR THE REAL GENERAL GENERALIZED EIGENPROBLEM A*X = (LAMBDA)*B*X

RS DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX

RSB	DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC BAND MATRIX
RSG	DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS FOR THE REAL SYMMETRIC GENERALIZED EIGENPROBLEM A*X = (LAMBDA)*B*X
RSGAB	DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS FOR THE REAL SYMMETRIC GENERALIZED EIGENPROBLEM A*B*X = (LAMBDA)*X
RSGBA	DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS FOR THE REAL SYMMETRIC GENERALIZED EIGENPROBLEM B*A*X = (LAMBDA)*X
RSP	DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC PACKED MATRIX
RST	DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC TRIDIAGONAL MATRIX
RT	DRIVER SUBROUTINE TO DETERMINE THE EIGENVALUES AND EIGENVECTORS OF A CERTAIN REAL TRIDIAGONAL MATRIX
SVD	COMPUTE THE SINGULAR VALUE DECOMPOSITION OF AN ARBITRARY REAL RECTANGULAR MATRIX
TINVIT	DETERMINE SOME EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX
TQLRAT	DETERMINE THE EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX
TQL1	DETERMINE THE EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX
TQL2	DETERMINE THE EIENVALUES AND EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX
TRBAK1	BACK TRANSFORM THE EIGENVECTORS OF THAT SYMMETRIC TRIDIAGONAL MATRIX DETERMINED BY TRED1
TRBAK3	BACK TRANSFORM THE EIGENVECTORS OF THAT SYMMETRIC TRIDIAGONAL MATRIX DETERMINED BY TRED3
TRED1	REDUCE A REAL SYMMETRIC MATRIX TO A SYMMETRIC TRIDIAGONAL MATRIX USING ORTHOGONAL TRANSFORMATIONS
TRED2	RETURN A REAL SYMMETRIC MATRIX TO A SYMMETRIC TRIDIAGONAL MATRIX ACCUMULATING THE ORTHOGONAL TRANSFORMATIONS
TRED3	REDUCE A REAL SYMMETRIC MATRIX, STORED AS A ONE-DIMENSIONAL ARRAY, TO A SYMMETRIC TRIDIAGONAL MATRIX USING ORTHOGONAL TRIDIAGONAL MATRIX USING ORTHOGONAL TRANSFORMATIONS
TRIDIB	DETERMINE SOME EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX
TSTURM	DETERMINE SOME EIGENVALUES AND EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX

*** FUNPACK ***

SPECIAL FUNCTIONAL SUBROUTINE PACKAGE FROM ARGONNE NATIONAL LABORATORY CONTAINING 24 USER-CALLABLE ROUTINES FOR BESSEL FUNCTIONS, DAWSON'S INTEGRAL, ELLIPTIC INTEGRALS OF THE FIRST AND SECOND KIND AND EXPONENTIAL INTEGRAL.

REFERENCES: MASTER DOCUMENTS ON FILE IN USER SERVICES.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'FUNPACK' INCLUDE:

BESEI0	FUNCTION TO CALCULATE MODIFIED BESSEL FUNCTIONS OF THE FIRST KIND OF ORDER ZERO, EXP(-ABS(X))*I0(X)
BESEI1	FUNCTION TO CALCULATE MODIFIED BESSEL FUNCTIONS OF THE FIRST KIND OF ORDER ONE, EXP(-ABS(X))*I1(X)
BESEK0	COMPUTE MODIFIED BESSEL FUNCTIONS OF THE SECOND KIND OF ORDER ZERO, EXP(X)*K0(X), FOR REAL, POSITIVE X
BESEK1	COMPUTE MODIFIED BESSEL FUNCTIONS OF THE SECOND KIND OF ORDER ONE, EXP(X)*K1(X), FOR REAL, POSITIVE X
BESI0	FUNCTION TO CALCULATE MODIFIED BESSEL FUNCTIONS OF THE FIRST KIND OF ORDER ZERO, I0(X)
BESI1	FUNCTION TO CALCULATE MODIFIED BESSEL FUNCTIONS OF THE FIRST KIND OF ORDER ONE, I1(X)
BESJ0	FUNCTION TO CALCULATE BESSEL FUNCTIONS OF THE FIRST KIND OF ORDER ZERO, J0(X)
BESJ1	FUNCTION TO CALCULATE BESSEL FUNCTIONS OF THE FIRST KIND OF ORDER ONE, J1(X)
BESK0	COMPUTE MODIFIED BESSEL FUNCTIONS OF THE SECOND KIND OF ORDER ZERO, K0(X), FOR REAL, POSITIVE X
BESK1	COMPUTE MODIFIED BESSEL FUNCTIONS OF THE SECOND KIND OF ORDER ONE, K1(X), FOR REAL, POSITIVE X
BESY	SUBROUTINE TO COMPUTE BESSEL FUNCTIONS OF THE SECOND KIND OF NON-NEGATIVE ORDER, Y-SUB-NU(X), FOR REAL, POSITIVE X (SEE YNU)
DAW	FUNCTION TO COMPUTE DAWSON'S INTEGRAL FOR ALL REAL ARGUMENTS

EI	COMPUTE EXPONENTIAL INTEGRAL, EI(X)
ELIE1	COMPUTE COMPLETE ELLIPTIC INTEGRALS OF THE SECOND KIND, E(CAY**2)
ELIEM	COMPUTE COMPLETE ELLIPTIC INTEGRALS OF THE SECOND KIND, E(1-ETA)
ELIK1	COMPUTE COMPLETE ELLIPTIC INTEGRALS OF THE FIRST KIND, K(CAY**2)
ELIKM	COMPUTE COMPLETE ELLIPTIC INTEGRALS OF THE FIRST KIND, K(1-ETA)
ELIPE	COMPUTE COMPLETE COMPLETE ELLIPTIC INTEGRALS OF THE SECOND KIND, E(CAYSQ)
ELIPK	COMPUTE COMPLETE ELLIPTIC INTEGRALS OF THE FIRST KIND, K(CAYSQ)
EONE	COMPUTE EXPONENTIAL INTEGRAL, E-SUB-1(X)
EXPEI	COMPUTE EXPONENTIAL INTEGRAL, EXP(-X)*EI(X)
MONERR	ERROR HANDLING FACILITIES, INCLUDING USER INTERACTION, FOR FUNPACK
PSI	FUNCTION TO COMPUTE LOGARITHMIC DERIVATIVE OF THE GAMMA FUNCTION FOR REAL ARGUMENTS
YNU	FUNCTION TO COMPUTE BESSEL FUNCTIONS OF THE SECOND KIND OF NON-NEGATIVE REAL ORDER, Y-SUB-NU(X), FOR REAL, POSITIVE X (SEE BESY)

*** IMSL ***
(PROPRIETARY)

THE INTERNATIONAL MATHEMATICAL AND STATISTICAL LIBRARIES PACKAGE (EDITION 9) CONTAINS OVER 517 SUBROUTINES IN THE FOLLOWING AREAS:

A - ANALYSIS OF EXPERIMENTAL DESIGN DATA
B - BASIC STATISTICS
C - CATEGORIZED DATA ANALYSIS
D - DIFFERENTIAL EQUATIONS, QUADRATURE, DIFFERENTIATION
E - EIGENANALYSIS
F - FORECASTING, ECONOMETRICS, TIME SERIES
G - GENERATION AND TESTING OF RANDOM NUMBERS, GOODNESS OF FIT
I - INTERPOLATION, APPROXIMATION AND SMOOTHING
L - LINEAR ALGEBRAIC EQUATIONS
M - MATHEMATICAL AND STATISTICAL SPECIAL FUNCTIONS
N - NONPARAMETRIC STATISTICS
O - OBERVATION STRUCTURE
R - REGRESSION ANALYSIS
S - SAMPLING
U - UTILITY FUNCTIONS
V - VECTOR-MATRIX ARITHMETIC
Z - ZEROS AND EXTREMA, LINEAR PROGRAMMING

REFERENCES: THE IMSL LIBRARY, VOLUMES 1 THRU 4.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'IMSL' INCLUDE:

AAHELP	DETAILED INFORMATION ON IMSL CONVENTIONS FOR DOCUMENTATION AND NOTATION, INPUT/OUTPUT, ERROR DETECTING, MATRIX/VECTOR STORAGE MODES
ABIBN	ANALYSIS OF BALANCED INCOMPLETE BLOCK AND BALANCED LATTICE DESIGNS
ACRDAN	ANALYSIS OF ONE-WAY CLASSIFICATION DESIGN DATA
ACTRST	CONTRAST ESTIMATES AND SUMS OF SQUARES
AFACN	FULL FACTORIAL PLAN ANALYSIS
AFACT	SUMS OF SQUARES, MEAN SQUARES, DEGREES OF FREEDOM, AND MEANS FOR ALL EFFECTS IN A FULL FACTORIAL PLAN, ALLOWING REPLICATION ON OPTION
AGBACP	ANALYSIS OF BALANCED COMPLETE EXPERIMENTAL DESIGN STRUCTURE DATA
AGLMOD	GENERAL LINEAR MODEL ANALYSIS
AGVACL	ONE OR TWO-SIDED INTERVAL ESTIMATE OF A VARIANCE COMPONENT
AGXPM	EXPECTED MEAN SQUARES FOR BALANCED COMPLETE DESIGN MODELS

ALGAMA	EVALUATE THE LOG (BASE E) OF THE ABSOLUTE VALUE OF THE GAMMA FUNCTION (GLGAMA=ALGAMA)
ALSQAN	ANALYSIS OF LATIN SQUARE DESIGN DATA
AMEANS	PREPARATION OF A SET OF UNBALANCED DATA FOR ANALYSIS BY THE METHOD OF UNWEIGHTED MEANS
ANCOV1	COVARIANCE ANALYSIS FOR ONE-WAY CLASSIFICATION DESIGN DATA
ANESTE	ANALYSIS OF COMPLETELY NESTED DESIGN DATA WITH EQUAL NUMBERS IN THE SUBCLASSES
ANESTU	ANALYSIS OF COMPLETELY NESTED DESIGN DATA WITH UNEQUAL NUMBERS IN THE SUBCLASSES
AORDR	REORDERING OF THE DATA OBTAINED FROM ANY BALANCED COMPLETE EXPERIMENTAL DESIGN
ARCBAN	ANALYSIS OF TWO-WAY CLASSIFICATION DESIGN DATA
ASNKMC	STUDENT-NEWMAN-KEULS MULTIPLE COMPARISON TEST
BDCOU1	TALLY OF OBSERVATIONS INTO A ONE-WAY FREQUENCY TABLE
BDCOU2	TALLY OF OBSERVATIONS INTO A TWO-WAY FREQUENCY TABLE
BDLTV	PRODUCE LETTER-VALUE SUMMARY
BDTRGI	TRANSGENERATION OF THE COLUMNS OF A MATRIX (IN-CORE VERSION)
BDTRGO	TRANSGENERATION OF THE COLUMNS OF A MATRIX (OUT-OF-CORE VERSION)
BECOR	ESTIMATES OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS (OUT-OF-CORE VERSION)
BECORI	ESTIMATES OF MEANS, STANDARD DEVIATIONS, AND CORRELATION COEFFICIENTS (IN-CORE VERSION)
BECOVM	MEANS AND VARIANCE-COVARIANCE MATRIX
BECTR	TETRACHORIC CORRELATION COEFFICIENT ESTIMATION
BECVL	VARIANCES AND COVARIANCES OF LINEAR FUNCTIONS (OUT-OF-CORE VERSION)
BECVLI	VARIANCES AND COVARIANCES OF LINEAR FUNCTIONS (IN-CORE VERSION)
BEGRPS	MOMENTS ESTIMATION FOR GROUPED DATA WITH AND WITHOUT SHEPPARDS CORRECTIONS
BEIGRP	ESTIMATION OF BASIC STATISTICAL PARAMETERS USING GROUPED DATA
BEIUGR	ESTIMATION OF BASIC STATISTICAL PARAMETERS USING UNGROUPED DATA

BELBIN	INTERVAL ESTIMATE OF THE PARAMETER P OF THE BINOMIAL DISTRIBUTION
BELPOS	INTERVAL ESTIMATE OF THE PARAMETER LAMBDA OF THE POISSON DISTRIBUTION
BEMDP	MEDIAN POLISH OF A TWO-WAY TABLE
BEMIRI	ESTIMATES OF MEANS, SIMPLE REGRESSION COEFFICIENTS, THEIR INTERCEPTS, STANDARD ERRORS OF THE REGRESSION COEFFICIENTS, AND STANDARD DEVIATIONS FOR ARRAYS WHICH CONTAIN MISSING VALUES (IN-CORE VERSION)
BEMIRO	ESTIMATES OF MEANS, SIMPLE REGRESSION COEFFICIENTS, THEIR INTERCEPTS, STANDARD ERRORS OF THE REGRESSION COEFFICIENTS, AND STANDARD DEVIATIONS FOR ARRAYS WHICH CONTAIN MISSING VALUES (OUT-OF-CORE VERSION)
BEMMI	ESTIMATES OF MEANS, STANDARD DEVIATIONS, CORRELATION COEFFICIENTS, SKEWNESS AND KURTOSIS FROM A DATA MATRIX CONTAINING MISSING OBSERVATIONS (IN-CORE VERSION)
BEMMO	ESTIMATES OF MEANS, STANDARD DEVIATIONS, CORRELATION COEFFICIENTS, SKEWNESS AND KURTOSIS FROM A DATA MATRIX CONTAINING MISSING OBSERVATIONS (OUT OF CORE VERSION)
BEMNON	LOCATION (MEAN) INFERENCES USING A SAMPLE FROM A NORMAL POPULATION WITH KNOWN VARIANCE
BEMSON	MEAN AND VARIANCE INFERENCES USING A SAMPLE FROM A NORMAL POPULATION
BENSON	VARIANCE INFERENCES USING A SAMPLE FROM A NORMAL POPULATION WITH KNOWN MEAN
BEPAT	MEAN AND VARIANCE INFERENCES USING SAMPLES FROM EACH OF TWO NORMAL POPULATIONS WITH UNEQUAL VARIANCES
BEPET	MEAN AND VARIANCE INFERENCES USING SAMPLES FROM EACH OF TWO NORMAL POPULATIONS WITH EQUAL VARIANCES
BESRB	BISERIAL AND POINT-BISERIAL CORRELATION COEFFICIENTS FOR A QUALITATIVELY DICHOTOMIZED VARIABLE AND A NUMERICALLY MEASURABLE AND CLASSIFIED VARIABLE
BESRN	BISERIAL CORRELATION COEFFICIENT FOR A QUALITATIVELY DICHOTOMIZED VARIABLE AND A NUMERICALLY OR QUALITATIVELY CLASSIFIED VARIABLE
CAXPY	COMPUTE A CONSTANT TIMES A VECTOR PLUS A VECTOR, ALL COMPLEX (VBLA=CAXPY)
CBNRHO	ESTIMATION OF THE BIVARIATE NORMAL CORRELATION COEFFICIENT USING A CONTINGENCY TABLE
CCOPY	COPY A VECTOR X TO A VECTOR Y, BOTH COMPLEX (VBLA=CCOPY)

CDOTC	COMPUTE COMPLEX DOT PRODUCT USING CONJUGATED VECTOR COMPONENTS (VBLA=CDOTC)
CDOTU	COMPUTE COMPLEX DOT PRODUCT USING UNCONJUGATED VECTOR COMPONENTS (VBLA=CDOTU)
CSCAL	COMPUTE A COMPLEX CONSTANT TIMES A COMPLEX VECTOR (VBLA=CSCAL)
CSSCAL	COMPUTE A REAL CONSTANT TIMES A COMPLEX VECTOR (VBLA=CSSCAL)
CSWAP	INTERCHANGE VECTORS X AND Y, BOTH COMPLEX (VBLA=CSWAP)
CTLLF	LOG-LINEAR FIT OF CONTINGENCY TABLE
CTPR	COMPUTE EXACT PROBABILITIES FOR CONTINGENCY TABLES
CTRBYC	ANALYSIS OF A CONTINGENCY TABLE
CZDOTC	COMPUTE COMPLEX DOT PRODUCT USING CONJUGATED VECTOR COMPONENTS (AND DOUBLE PRECISION ACCUMULATION) (VBLA=CZDOTC)
CZDOTU	COMPUTE COMPLEX DOT PRODUCT USING UNCONJUGATED VECTOR COMPONENTS (AND DOUBLE PRECISION ACCUMULATION) (VBLA=CZDOTU)
DASUM	COMPUTE DOUBLE PRECISION SUM OF ABSOLUTE VALUES (VBLA=DASUM)
DAXPY	COMPUTE A CONSTANT TIMES A VECTOR PLUS A VECTOR, ALL DOUBLE PRECISION (VBLA=DAXPY)
DBCEVU	BICUBIC SPLINE MIXED PARTIAL DERIVATIVE EVALUATOR
DBCQDU	BICUBIC SPLINE QUADRATURE
DBLINT	NUMERICAL INTEGRATION BY ADAPTIVE ROMBERG METHOD (OVER A RECTANGLE)
DCADRE	NUMERICAL INTEGRATION OF A FUNCTION USING CAUTIOUS ADAPTIVE ROMBERG EXTRAPOLATION
DCOPY	COPY A VECTOR X TO A VECTOR Y, BOTH DOUBLE PRECISION (VBLA=DCOPY)
DCSEVU	CUBIC SPLINE FIRST AND SECOND DERIVATIVE EVALUATOR
DCSQDU	CUBIC SPLINE QUADRATURE
DDOT	COMPUTE DOUBLE PRECISION DOT PRODUCT (VBLA=DDOT)
DGEAR	DIFFERENTIAL EQUATION SOLVER - VARIABLE ORDER ADAMS PREDICTOR CORRECTOR METHOD OR GEARS METHOD
DNRM2	COMPUTE THE EUCLIDEAN LENGTH OR L2 NORM OF A DOUBLE PRECISION VECTOR (VBLA=DNRM2)
DREBS	DIFFERENTIAL EQUATION SOLVER - BURLISCH-STOER EXTRAPOLATION METHOD

DROT	APPLY GIVENS PLANE ROTATION (DOUBLE PRECISION) (VBLA=DROT)
DROTG	CONSTRUCT GIVENS PLANE ROTATION (DOUBLE PRECISION) (VBLA=DROTG)
DROTM	APPLY A MODIFIED GIVENS PLANE ROTATION (DOUBLE PRECISION) (VBLA=DROTM)
DROTMG	CONSTRUCT A MODIFIED GIVENS PLANE ROTATION (DOUBLE PRECISION) (VBLA=DROTGM)
DSCAL	COMPUTE A DOUBLE PRECISION CONSTANT TIMES A DOUBLE PRECISION VECTOR (VBLA=DSCAL)
DSDOT	COMPUTE SINGLE PRECISION DOT PRODUCT USING DOUBLE PRECISION ACCUMULATION (VBLA=DSDOT)
DSWAP	INTERCHANGE VECTORS X AND Y, BOTH DOUBLE PRECISION (VBLA=DSWAP)
DTPTB	MULTIPLE SHOOTING METHOD (BOUNDARY VALUE)
DVERK	DIFFERENTIAL EQUATION SOLVER - RUNGE KUTTA-VERNER FIFTH AND SIXTH ORDER METHOD
EBALAC	BALANCE A COMPLEX GENERAL MATRIX AND ISOLATE EIGENVALUES WHENEVER POSSIBLE
EBALAF	BALANCE A REAL MATRIX IN THE EUCLIDEAN NORM
EBBCKC	BACK TRANSFORMATION OF THE EIGENVECTORS OF A BALANCED COMPLEX MATRIX TO FORM THE EIGEN- VECTORS OF THE ORIGINAL MATRIX
EBBCKF	BACK TRANSFORMATION OF THE EIGENVECTORS OF A BALANCED REAL MATRIX TO FORM THE EIGEN- VECTORS OF THE ORIGINAL MATRIX
EHBCKF	BACK TRANSFORMATION OF THE EIGENVECTORS OF A REAL UPPER HESSENBERG MATRIX TO FORM THE EIGENVECTORS OF THE ORIGINAL MATRIX
EHBCKH	BACK TRANSFORMATION OF THE EIGENVECTORS OF A REAL SYMMETRIC TRIDIAGONAL MATRIX OBTAINED FROM THE HOUSEHOLDER REDUCTION OF A HERMITIAN MATRIX
EHESSC	REDUCTION OF A GENERAL COMPLEX MATRIX TO COMPLEX UPPER HESSENBERG FORM
EHESSF	REDUCTION OF A NONSYMMETRIC MATRIX TO UPPER HESSENBERG FORM BY ORTHOGONAL TRANSFORMATIONS
EHOBKS	BACK TRANSFORMATION TO FORM THE EIGENVECTORS OF THE ORIGINAL SYMMETRIC MATRIX FROM THE EIGENVECTORS OF THE TRIDIAGONAL MATRIX
EHOUSH	REDUCTION OF A COMPLEX HERMITIAN MATRIX TO REAL SYMMETRIC TRIDIAGONAL FORM

EHOUSS	REDUCTION OF A SYMMETRIC MATRIX TO SYMMETRIC TRIDIAGONAL FORM USING A HOUSEHOLDER REDUCTION
EIGBS	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A BAND SYMMETRIC MATRIX
EIGCC	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A COMPLEX GENERAL MATRIX
EIGCH	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A COMPLEX HERMITIAN MATRIX
EIGRF	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A REAL GENERAL MATRIX IN FULL STORAGE MODE
EIGRS	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A REAL SYMMETRIC MATRIX IN SYMMETRIC STORAGE MODE
EIGZC	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF THE SYSTEM A*X=LAMBDA*B*X WHERE A AND B ARE COMPLEX MATRICES
EIGZF	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF THE SYSTEM A*X=LAMBDA*B*X WHERE A AND B ARE REAL MATRICES
ELRH1C	EIGENVALUES OF A COMPLEX UPPER HESSENBERG MATRIX
ELRH2C	EIGENVALUES AND EIGENVECTORS OF A COMPLEX UPPER HESSENBERG MATRIX AND BACKTRANS- FORMATION OF THE EIGENVECTORS
ELZHC	REDUCE TWO COMPLEX MATRICES, A AND B, SIMUL- TANEOUSLY, A TO UPPER HESSENBERG AND B TO UPPER TRIANGULAR FORM
ELZVC	CALCULATE THE EIGENVALUES AND, OPTIONALLY, EIGENVECTORS OF THE SYSTEM A*Z=LAMBDA*B*Z WHERE COMPLEX MATRIX A IS UPPER HESSENBERG AND COMPLEX MATRIX B IS UPPER TRIANGULAR
EQRH1F	EIGENVECTORS OF A REAL UPPER HESSENBERG MATRIX CORRESPONDING TO SPECIFIED EIGENVALUES
EQRH3F	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A REAL UPPER HESSENBERG MATRIX
EQRT1S	SMALLEST OR LARGEST M EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX
EQRT2S	EIGENVALUES AND (OPTIONALLY) EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX USING THE QL METHOD
EQRT3S	THE SMALLEST (OR LARGEST) EIGENVALUES OF A TRIDIAGONAL MATRIX IN ALGEBRAIC VALUE WHOSE SUM EXCEEDS A GIVEN VALUE
EQZQF	HESSENBERG REDUCTION FOR THE GENERALIZED EIGENVALUE PROBLEM A*X=LAMBDA*B*X. REDUCTION OF A TO UPPER HESSENBERG FORM AND B TO UPPER TRIANGULAR FORM

EQZTF	EXPLICIT QZ ITERATION FOR THE GENERALIZED EIGENVALUE PROBLEM A*X=LAMBDA*B*X WHERE A IS IN UPPER HESSENBERG FORM AND B IS UPPER TRIANGULAR. A IS REDUCED TO QUASI-UPPER TRIANGULAR FORM WHILE KEEPING MATRIX B UPPER TRIANGULAR
EQZVF	EIGENVALUES AND OPTIONALLY, EIGENVECTORS OF THE GENERALIZED EIGENVALUE PROBLEM A*Z=LAMBDA*B*Z WHERE B IS UPPER TRIANGULAR AND A IS QUASI-UPPER TRIANGULAR.
ERF	EVALUATE THE ERROR FUNCTION (MERF=ERF)
ERFC	EVALUATE THE COMPLEMENTED ERROR FUNCTION (MERRC=ERFC)
FFTCC	FAST FOURIER TRANSFORM OF A COMPLEX VALUED SEQUENCE
FFTRC	FAST FOURIER TRANSFORM OF A REAL VALUED SEQUENCE
FFTSC	SINE AND COSINE TRANSFORMS OF A REAL VALUED SEQUENCE
FFT2C	FAST FOURIER TRANSFORM OF A COMPLEX VALUED SEQUENCE OF LENGTH EQUAL TO A POWER TWO
FFT3D	FAST FOURIER TRANSFORM OF A COMPLEX VALUED ARRAY
FLINV	INVERSE LAPLACE TRANSFORM OF A COMPLEX FUNCTION
FTARPS	PRELIMINARY ESTIMATION OF THE AUTOREGRESSIVE PARAMETERS IN AN ARIMA STOCHASTIC MODEL
FTAUTO	MEAN, VARIANCE, AUTOCOVARIANCES, AUTOCORRELATIONS, AND PARTIAL AUTOCORRELATIONS FOR A STATIONARY TIME SERIES
FTCAST	TIME SERIES FORECASTS AND PROBABILITY LIMITS USING AN ARIMA (BOX-JENKINS) MODEL
FTCMP	NON-SEASONAL ARIMA (BOX-JENKINS) STOCHASTIC MODEL ANALYSIS FOR A SINGLE TIME SERIES WITH FULL PARAMETER ITERATION AND MAXIMUM LIKELIHOOD ESTIMATION
FTCROS	MEANS, VARIANCES, CROSS-COVARIANCES, AND CROSS-CORRELATIONS FOR TWO MUTUALLY STATIONARY N CHANNEL TIME SERIES
FTCRXY	CROSS-COVARIANCE OF TWO MUTUALLY STATIONARY TIME SERIES
FTFPS	FAST FOURIER TRANSFORM ESTIMATES OF POWER SPECTRA AND CROSS SPECTRA OF TIME SERIES
FTFREQ	SINGLE OR MULTICHANNEL TIME SERIES ANALYSIS IN THE TIME AND FREQUENCY DOMAINS
FTGEN	GENERATION OF A TIME SERIES FROM A GIVEN ARIMA (BOX-JENKINS) STOCHASTIC MODEL
FTKALM	KALMAN FILTERING
FTMPS	PRELIMINARY ESTIMATION OF THE MOVING AVERAGE PARAMETERS IN AN ARIMA STOCHASTIC MODEL

FTMXL	MAXIMUM LIKELIHOOD ESTIMATION OF AUTOREGRESSIVE AND MOVING AVERAGE PARAMETERS IN AN ARIMA (BOX-JENKINS) STOCHASTIC MODEL
FTRDIF	TRANSFORMATIONS, DIFFERENCES AND SEASONAL DIFFERENCES OF A TIME SERIES FOR MODEL IDENTIFICATION
FTTRN	PRELIMINARY PARAMETER ESTIMATES FOR A UNIVARIATE TRANSFER FUNCTION MODEL
FTWEIN	WIENER FORECAST FOR A STATIONARY STOCHASTIC PROCESS
FTWENM	MULTICHANNEL WIENER FORECAST
FTWENX	MAXIMUM LIKELIHOOD PARAMETER ESTIMATES FOR A MULTICHANNEL, SINGLE OUTPUT TIME SERIES MODEL
GAMMA	EVALUATE THE GAMMA FUNCTION
GFIT	CHI-SQUARED GOODNESS OF FIT TEST
GGAMR	ONE PARAMETER GAMMA RANDOM DEVIATE GENERATOR, AND USABLE AS THE BASIS FOR TWO PARAMETER GAMMA, EXPONENTIAL, CHI-SQUARED, CHI, BETA, T, AND F DEVIATE GENERATION
GGBN	BINOMIAL RANDOM DEVIATE GENERATOR
GGBNR	NEGATIVE BINOMIAL RANDOM DEVIATE GENERATOR
GGBTR	BETA RANDOM DEVIATE GENERATOR
GGCAY	CAUCHY RANDOM DEVIATE GENERATOR
GGCHS	CHI-SQUARED RANDOM DEVIATE GENERATOR
GGDA	GENERAL DISCRETE DISTRIBUTION RANDOM DEVIATE GENERATOR USING ALIAS METHOD
GGDT	GENERAL DISCRETE DISTRIBUTION RANDOM DEVIATE GENERATOR USING TABLE LOOKUP
GGEOT	GEOMETRIC RANDOM DEVIATE GENERATOR
GGEXN	EXPONENTIAL RANDOM DEVIATE GENERATOR
GGEXT	RANDOM DEVIATE GENERATOR FOR MIXTURE OF TWO EXPONENTIALS
GGHPR	HYPERGEOMETRIC RANDOM DEVIATE GENERATOR
GGMAR	ONE PARAMETER GAMMA RANDOM DEVIATE GENERATOR WITH EXTENSIONS
GGMTN	MULTINOMIAL RANDOM DEVIATE GENERATOR
GGNLG	LOG-NORMAL RANDOM DEVIATE GENERATOR
GGNML	NORMAL OR GAUSSIAN RANDOM DEVIATE GENERATOR
GGNPM	NORMAL RANDOM DEVIATE GENERATOR VIA THE POLAR METHOD

GGNQF	NORMAL RANDOM DEVIATE GENERATOR - FUNCTION FORM OF GGNML
GGNSM	MULTIVARIATE NORMAL RANDOM DEVIATE GENERATOR WITH GIVEN COVARIANCE MATRIX
GGPON	POISSON RANDOM DEVIATE GENERATOR WHERE THE POISSON PARAMETER CHANGES FREQUENTLY
GGPOS	POISSON RANDOM DEVIATE GENERATOR WHERE THE POISSON PARAMETER DOES NOT CHANGE OFTEN
GGSPH	GENERATION OF UNIFORM RANDOM DEVIATES FROM THE SURFACE OF THE UNIT SPHERE IN 3 OR 4 SPACE
GGSTA	STABLE DISTRIBUTION RANDOM DEVIATE GENERATOR
GGTRA	TRIANGULAR DISTRIBUTION RANDOM DEVIATE GENERATOR
GGUBFS	BASIC UNIFORM (0,1) RANDOM NUMBER GENERATOR - FUNCTION FORM OF GGUBS
GGUBS	BASIC UNIFORM (0,1) PSEUDO-RANDOM NUMBER GENERATOR
GGUBT	UNIFORM (0,1) PSEUDO-RANDOM NUMBER GENERATOR USING ALTERNATE MULTIPLIER
GGUD	DISCRETE UNIFORM RANDOM NUMBER GENERATOR
GGUW	UNIFORM (0,1) RANDOM NUMBER GENERATOR WITH SHUFFLING
GGVCR	GENERAL CONTINUOUS DISTRIBUTION RANDOM DEVIATE GENERATOR
GGWIB	WEIBULL RANDOM DEVIATE GENERATOR
GTCN	SAMPLE SIZE OR NUMBER OF CLASS INTERVALS DETERMINATION FOR CHI-SQUARED TEST APPLICATIONS
GTDDU	D-SQUARE TALLY
GTD2T	THE D-SQUARE TEST
GTMNT	MOMENTS AND STANDARDIZED MOMENTS OF UNIFORM RANDOM NUMBERS
GTNOR	TEST FOR NORMALITY OF RANDOM DEVIATES
GTPBC	COUNT OF THE NUMBER OF ZERO BITS IN A GIVEN SUBSET OF A REAL WORD
GTPKP	PROBABILITY DISTRIBUTION OF N ELEMENTS INTO TWO EQUI-PROBABLE STATES
GTPL	POKER TEST TALLY OF HAND TYPES AND STATISTICS
GTPOK	PERFORM THE POKER TEST
GTPR	TALLY OF COORDINATES OF PAIRS (OR LAGGED PAIRS) OF RANDOM NUMBERS

GTPST	PAIRS TEST OR GOODS SERIAL TEST
GTRN	RUNS TEST
GTRTN	TALLY OF NUMBER OF RUNS UP AND DOWN
GTTRT	TALLY FOR TRIPLETS TEST
GTTT	TRIPLETS TEST
IBCEVU	BICUBIC SPLINE EVALUATOR
IBCICU	BICUBIC SPLINE TWO-DIMENSIONAL COEFFICIENT CALCULATOR
IBCIEU	BICUBIC SPLINE TWO-DIMENSIONAL INTERPOLATOR
ICAMAX	FIND THE SMALLEST INDEX OF THE MAXIMUM MAGNITUDE OF A COMPLEX VECTOR (VBLA=ICAMAX)
ICSCCU	INTERPOLATION BY CUBIC SPLINES (EASY TO USE)
ICSEVU	EVALUATION OF A CUBIC SPLINE
ICSFKU	LEAST SQUARES APPROXIMATION BY CUBIC SPLINES - FIXED KNOTS
ICSICU	INTERPOLATORY APPROXIMATION BY CUBIC SPLINES WITH ARBITRARY SECOND DERIVATIVE END CONDITIONS
ICSMOU	ONE-DIMENSIONAL DATA SMOOTHING BY ERROR DETECTION
ICSPLN	INTERPOLATION BY CUBIC SPLINES WITH PERODIC END CONDITIONS
ICSSCU	CUBIC SPLINE DATA SMOOTHER WITH USER SUPPLIED PARAMETER
ICSSCV	CUBIC SPLINE DATA SMOOTHER (EASY TO USE)
ICSVKU	LEAST SQUARES APPROXIMATION BY CUBIC SPLINES - VARIABLE KNOTS
IDAMAX	FIND THE SMALLEST INDEX OF THE MAXIMUM MAGNITUDE OF A DOUBLE PRECISION VECTOR (VBLA=IDAMAX)
IFLSQ	LEAST SQUARES APPROXIMATION WITH USER SUPPLIED BASIS FUNCTIONS
IQHSCU	ONE-DIMENSIONAL QUASI-CUBIC HERMITE INTERPOLATION
IQHSCV	SMOOTH SURFACE FITTING WITH IRREGULARLY DISTRIBUTED DATA POINTS (INTERPOLATION)
IRATCU	RATIONAL WEIGHTED CHEBYCHEV APPROXIMATION OF A CONTINUOUS FUNCTION
ISAMAX	FIND THE SMALLEST INDEX OF THE MAXIMUM MAGNITUDE OF A SINGLE PRECISION VECTOR (VBLA=ISAMAX)
LEQT1B	LINEAR EQUATION SOLUTION - BAND STORAGE MODE - SPACE ECONOMIZER SOLUTION

LEQT1C MATRIX DECOMPOSITION, LINEAR EQUATION SOLUTION - SPACE ECONOMIZER SOLUTION - COMPLEX MATRICES

LEQT1F LINEAR EQUATION SOLUTION - FULL STORAGE MODE - SPACE ECONOMIZER SOLUTION

LEQT1P LINEAR EQUATION SOLUTION - POSITIVE DEFINITE MATRIX - SYMMETRIC STORAGE MODE - SPACE ECONOMIZER SOLUTION

LEQT2B LINEAR EQUATION SOLUTION - BAND STORAGE MODE - HIGH ACCURACY SOLUTION

LEQT2F LINEAR EQUATION SOLUTION - FULL STORAGE MODE - HIGH ACCURACY SOLUTION

LEQT2P LINEAR EQUATION SOLUTION - POSITIVE DEFINITE MATRIX - SYMMETRIC STORAGE MODE - HIGH ACCURACY SOLUTION

LEQ1PB LINEAR EQUATION SOLUTION - POSITIVE DEFINITE SYMMETRIC BAND MATRIX - BAND SYMMETRIC STORAGE MODE - SPACE ECONOMIZER SOLUTION

LEQ1S LINEAR EQUATION SOLUTION - INDEFINITE MATRIX - SYMMETRIC STORAGE MODE - SPACE ECONOMIZER SOLUTION

LEQ2C LINEAR EQUATION SOLUTION - COMPLEX MATRIX - HIGH ACCURACY SOLUTION

LEQ2PB LINEAR EQUATION SOLUTION - POSITIVE DEFINITE BAND SYMMETRIC MATRIX - BAND SYMMETRIC STORAGE MODE - HIGH ACCURACY SOLUTION

LEQ2S LINEAR EQUATION SOLUTION - INDEFINITE MATRIX - SYMMETRIC STORAGE MODE - HIGH ACCURACY SOLUTION

LGINF GENERALIZED INVERSE OF REAL MATRIX

LINV1F INVERSION OF A MATRIX - FULL STORAGE MODE - SPACE ECONOMIZER SOLUTION

LINV1P INVERSION OF MATRIX - POSITIVE DEFINITE - SYMMETRIC STORAGE MODE - SPACE ECONOMIZER SOLUTION

LINV2F INVERSION OF A MATRIX - FULL STORAGE MODE - HIGH ACCURACY SOLUTION

LINV2P INVERSION OF A MATRIX - POSITIVE DEFINITE - SYMMETRIC STORAGE MODE - HIGH ACCURACY SOLUTION

LINV3F IN PLACE INVERSE, EQUATION SOLUTION, AND/OR DETERMINANT EVALUATION - FULL STORAGE MODE

LINV3P IN PLACE INVERSE, EQUATION SOLUTION, POSITIVE DEFINITE MATRIX - SYMMETRIC STORAGE MODE

LIN1PB INVERSION OF A MATRIX - POSITIVE DEFINITE BAND SYMMETRIC MATRIX - BAND SYMMETRIC STORAGE MODE - SPACE ECONOMIZER SOLUTION

LIN2PB	INVERSION OF MATRIX - POSITIVE DEFINITE BAND SYMMETRIC MATRIX - BAND SYMMETRIC STORAGE MODE - HIGH ACCURACY SOLUTION
LLBQF	SOLUTION OF LINEAR LEAST SQUARES - HIGH ACCURACY
LLSQF	SOLUTION OF A LINEAR LEAST SQUARES PROBLEM
LSVDB	SINGULAR VALUE DECOMPOSITION OF A BIDIAGONAL MATRIX
LSVDF	SINGULAR VALUE DECOMPOSITION OF A REAL MATRIX
LUDAPB	DECOMPOSITION OF A POSITIVE DEFINITE BAND SYMMETRIC MATRIX - BAND SYMMETRIC STORAGE MODE
LUDATF	L-U DECOMPOSITION BY THE CROUT ALGORITHM WITH OPTIONAL ACCURACY TEST
LUDECP	DECOMPOSITION OF A POSITIVE DEFINITE MATRIX - SYMMETRIC STORAGE MODE
LUELMF	ELIMINATION PART OF SOLUTION OF AX=B (FULL STORAGE MODE)
LUELMP	ELIMINATION PART OF THE SOLUTION OF AX=B - POSITIVE DEFINITE MATRIX - SYMMETRIC STORAGE MODE
LUELPB	ELIMINATION PART OF SOLUTION OF AX=B - POSITIVE DEFINITE BAND SYMMETRIC MATRIX - BAND SYMMETRIC STORAGE MODE
LUREFF	REFINEMENT OF SOLUTION TO LINEAR EQUATIONS - FULL STORAGE MODE
LUREFP	REFINEMENT OF SOLUTION TO LINEAR EQUATIONS - POSITIVE DEFINITE MATRIX - SYMMETRIC STORAGE MODE
LUREPB	REFINEMENT OF SOLUTION TO LINEAR EQUATIONS - POSITIVE DEFINITE BAND SYMMETRIC MATRIX - BAND SYMMETRIC STORAGE MODE
MDBETA	BETA PROBABILITY DISTRIBUTION FUNCTION
MDBETI	INVERSE BETA PROBABILITY DISTRIBUTION FUNCTION
MDBIN	BINOMIAL PROBABILITY DISTRIBUTION FUNCTION
MDBNOR	BIVARIATE NORMAL PROBABILITY DISTRIBUTION FUNCTION
MDCH	CHI-SQUARED PROBABILITY DISTRIBUTION FUNCTION
MDCHI	INVERSE CHI-SQUARED PROBABILITY DISTRIBUTION FUNCTION
MDCHN	NON-CENTRAL CHI-SQUARED PROBABILITY DISTRIBUTION FUNCTION
MDFD	F PROBABILITY DISTRIBUTION FUNCTION
MDFDRE	F PROBABILITY DISTRIBUTION FUNCTION (INTEGER OR FRACTIONAL DEGREES OF FREEDOM)
MDFI	INVERSE F PROBABILITY DISTRIBUTION FUNCTION

MDGAM	GAMMA PROBABILITY DISTRIBUTION FUNCTION
MDGC	GENERAL CONTINUOUS PROBABILITY DISTRIBUTION FUNCTION
MDGCI	INVERSE OF GENERAL CONTINUOUS PROBABILITY DISTRIBUTION FUNCTION
MDHYP	HYPERGEOMETRIC PROBABILITY DISTRIBUTION FUNCTION
MDNOR	NORMAL OR GAUSSIAN PROBABILITY DISTRIBUTION FUNCTION
MDNRIS	INVERSE STANDARD NORMAL (GAUSSIAN) PROBABILITY DISTRIBUTION FUNCTION
MDSMR	KOLMOGOROV-SMIRNOV STATISTICS ASYMPTOTIC PROBABILITY DISTRIBUTION FUNCTION
MDSTI	INVERSE OF A MODIFICATION OF STUDENTS T PROBABILITY DISTRIBUTION FUNCTION
MDTD	STUDENTS T PROBABILITY DISTRIBUTION FUNCTION
MDTN	NON-CENTRAL T PROBABILITY DISTRIBUTION FUNCTION
MDTNF	INTEGRAL RELATED TO CALCULATION OF NON- CENTRAL T AND BIVARIATE NORMAL PROBABILITY DISTRIBUTION FUNCTIONS
MDTPS	CUMULATIVE PROBABILITY AND, OPTIONALLY, INDIVIDUAL TERMS OF THE POISSON PROBABILITY DISTRIBUTION FUNCTION
MERFCI	INVERSE COMPLEMENTED ERROR FUNCTION
MERFI	INVERSE ERROR FUNCTION
MMBSI	MODIFIED BESSEL FUNCTION OF THE FIRST KIND OF ORDER ZERO
MMBSI1	MODIFIED BESSEL FUNCTION OF THE FIRST KIND OF ORDER ONE
MMBSJ	BESSEL FUNCTION OF THE FIRST KIND OF ORDER ZERO
MMBSJ1	BESSEL FUNCTION OF THE FIRST KIND OF ORDER ONE
MMBSK	MODIFIED BESSEL FUNCTION OF THE SECOND KIND OF ORDER ZERO
MMBSK1	MODIFIED BESSEL FUNCTION OF THE SECOND KIND OF ORDER ONE
MMBSYN	BESSEL FUNCTION OF THE SECOND KIND OF NON- NEGATIVE REAL FRACTIONAL ORDER FOR REAL POSITIVE ARGUMENTS
MMDAS	DAWSON INTEGRAL
MMDEI	EXPONENTIAL INTEGRALS
MMDELE	COMPLETE ELLIPTIC INTEGRAL OF THE SECOND KIND
MMDELK	COMPLETE ELLIPTIC INTEGRAL OF THE FIRST KIND

MMKELD	DERIVATIVES OF THE KELVIN FUNCTIONS (BER,BEI, KER, AND KEI) OF ORDER ZERO
MMKEL	KELVIN FUNCTIONS OF THE FIRST KIND, (BER,BEI), AND OF THE SECOND KIND, (KER,KEI), OF ORDER ZERO
MMKEL1	KELVIN FUNCTIONS OF THE FIRST KIND, (BER,BEI), AND OF THE SECOND KIND, (KER,KEI), OF ORDER ONE
MMPSI	LOGARITHMIC DERIVATIVE OF THE GAMMA FUNCTION
MSMRAT	RATIO OF THE ORDINATE TO THE UPPER TAIL AREA OF THE STANDARDIZED NORMAL (GAUSSIAN) DISTRIBUTION
NAK1	KRUSKAL-WALLIS TEST FOR IDENTICAL POPULATIONS
NAWNRP	WILSONS ANOVA (2 OR 3 WAY DESIGNS) WITHOUT REPLICATES
NAWRPE	WILSONS ANOVA (1, 2, OR 3 WAY DESIGNS) WITH EQUAL REPLICATION
NAWRPU	WILSONS ANOVA (1, 2, OR 3 WAY DESIGNS) WITH UNEQUAL REPLICATION
NBCYC	NOETHERS TEST FOR CYCLICAL TREND
NBQT	COCHRAN Q TEST
NBSDL	COX AND STUART SIGN TEST FOR TRENDS IN DISPERSION AND LOCATION
NBSIGN	SIGN TEST (FOR PERCENTILES)
NDEST	EVALUATE PROBABILITY DENSITY FUNCTION AT SPECIFIED POINTS
NDKER	NONPARAMETRIC PROBABILITY DENSITY FUNCTION (ONE DIMENSIONAL) ESTIMATION BY KERNEL METHOD
NDMPLE	NONPARAMETRIC PROBABILITY DENSITY FUNCTION (ONE DIMENSIONAL) ESTIMATION BY PENALIZED LIKELIHOOD METHOD
NHEXT	FISHERS EXACT METHOD FOR 2 BY 2 TABLES
NHINC	INCLUDANCE TEST
NKS1	KOLMOGOROV-SMIRNOV ONE-SAMPLE TEST
NKS2	KOLMOGOROV-SMIRNOV TWO-SAMPLE TEST
NMCC	CALCULATE AND TEST THE SIGNIFICANCE OF THE KENDALL COEFFICIENT OF CONCORDANCE
NMKEN	KENDALLS TEST FOR CORRELATION (RANK CORRELATION COEFFICIENT)
NMKSF	FREQUENCY DISTRIBUTION OF K AND THE PROBABILITY OF EQUALLING OR EXCEEDING K, WHERE K, THE TOTAL SCORE FROM THE KENDALL RANK CORRELATION COEFFICIENT CALCULATIONS, AND N, THE SAMPLE SIZE, ARE GIVEN

NMKTS	K-SAMPLE TRENDS TEST AGAINST ORDERED ALTERNATIVES
NMRANK	NUMERICAL RANKING
NMTIE	TIE STATISTICS, GIVEN A SAMPLE OF OBSERVATIONS
NRBHA	BHAPKAR V TEST
NRWMD	WILCOXON SIGNED RANK TEST
NRWRST	WILCOXONS RANK-SUM TEST
OCDIS	PAIRWISE EUCLIDEAN DISTANCE BETWEEN COLUMNS OF A MATRIX
OCLINK	PERFORM A SINGLE-LINKAGE OR COMPLETE-LINKAGE HIERARCHICAL CLUSTER ANALYSIS GIVEN A SIMILARITY MATRIX
ODFISH	LINEAR DISCRIMINANT ANALYSIS METHOD OF FISHER FOR REDUCING THE NUMBER OF VARIABLES
ODNORM	MULTIVARIATE NORMAL LINEAR DISCRIMINANT ANALYSIS AMONG SEVERAL KNOWN GROUPS
OFCOEF	COMPUTE A MATRIX OF FACTOR SCORE COEFFICIENTS FOR INPUT TO IMSL ROUTINE OFSCOR
OFCOMM	COMPUTE AN UNROTATED FACTOR LOADING MATRIX ACCORDING TO A COMMON FACTOR MODEL BY UNWEIGHTED OR GENERALIZED LEAST SQUARES, OR BY MAXIMUM LIKELIHOOD PROCEDURES
OFHARR	TRANSFORMATION OF UNROTATED FACTOR LOADING MATRIX TO OBLIQUE AXES BY HARRIS-KAISER METHOD
OFIMAG	COMPUTE AN UNROTATED FACTOR LOADING MATRIX ACCORDING TO AN IMAGE MODEL
OFIMA3	LEAST SQUARES SOLUTION TO THE MATRIX EQUATION AT = B
OFPRI	COMPUTE AN UNROTATED FACTOR LOADING MATRIX ACCORDING TO A PRINCIPAL COMPONENT MODEL
OFPROT	OBLIQUE TRANSFORMATION OF THE FACTOR LOADING MATRIX USING A TARGET MATRIX, INCLUDING PIVOT AND POWER VECTOR OPTIONS
OFRESI	COMMUNALITIES AND NORMALIZED FACTOR RESIDUAL CORRELATION MATRIX CALCULATION
OFROTA	ORTHOGONAL ROTATION OF A FACTOR LOADING MATRIX USING A GENERALIZED ORTHOMAX CRITERION, INCLUDING QUARTIMAX, VARIMAX, AND EQUAMAX
OFSCHN	ORTHOGONAL TRANSFORMATION OF THE FACTOR LOADING MATRIX USING A TARGET MATRIX
OFSCOR	COMPUTE A SET OF FACTOR SCORES GIVEN THE FACTOR SCORE COEFFICIENT MATRIX

OIND	WILKS TEST FOR THE INDEPENDENCE OF K SETS OF MULTI-NORMAL VARIATES
OPRINC	PRINCIPAL COMPONENTS OF A MULTIVARIATE SAMPLE OF OBSERVATIONS
OTMLNR	MAXIMUM LIKELIHOOD ESTIMATION FROM GROUPED AND/OR CENSORED NORMAL DATA
RLCOMP	GENERATION OF AN ORTHOGONAL CENTRAL COMPOSITE DESIGN
RLDCQM	DECODING OF A QUADRATIC REGRESSION MODEL
RLDCVA	VARIANCE ESTIMATES FOR DECODED ORTHOGONAL POLYNOMIAL REGRESSION COEFFICIENTS
RLDCW	VARIANCES OF CODED ORTHOGONAL POLYNOMIAL REGRESSION COEFFICIENTS. FOR USAGE IN CONJUNCTION WITH IMSL ROUTINES RLFOTH AND RLFOTW, AND PROVIDED TO PREPARE INPUT FOR IMSL ROUTINE RLDCVA.
RLDOPM	COEFFICIENT DECODER FOR AN ORTHOGONAL POLYNOMIAL REGRESSION MODEL
RLEAP	LEAPS AND BOUNDS ALGORITHM FOR DETERMINING A NUMBER OF BEST REGRESSION SUBSETS FROM A FULL REGRESSION MODEL
RLFITI	PURE REPLICATION ERROR DEGREES OF FREEDOM AND SUM OF SQUARES (IN-CORE VERSION)
RLFITO	PURE REPLICATION ERROR DEGREES OF FREEDOM AND SUM OF SQUARES (OUT-OF-CORE VERSION)
RLFOR	FIT A UNIVARIATE CURVILINEAR REGRESSION MODEL USING ORTHOGONAL POLYNOMIALS WITH OPTIONAL WEIGHTING (EASY TO USE VERSION)
RLFOTH	FIT A UNIVARIATE CURVILINEAR REGRESSION MODEL USING ORTHOGONAL POLYNOMIALS
RLFOTW	FIT A UNIVARIATE CURVILINEAR REGRESSION MODEL USING ORTHOGONAL POLYNOMIALS WITH WEIGHTING
RLGQMI	CENTERING OF INDEPENDENT VARIABLE SETTINGS AND GENERATION OF CENTERED SQUARE AND CROSS PRODUCT TERMS (IN-CORE VERSION)
RLGQMO	CENTERING OF INDEPENDENT VARIABLE SETTINGS AND GENERATION OF UNCENTERED SQUARE AND CROSS PRODUCT TERMS (OUT-OF-CORE VERSION)
RLINCF	RESPONSE CONTROL USING A FITTED SIMPLE LINEAR REGRESSION MODEL
RLINPF	INVERSE PREDICTION USING A FITTED SIMPLE LINEAR REGRESSION MODEL
RLLAV	LINEAR REGRESSION USING LEAST ABSOLUTE VALUES CRITERION

RRLMV	LINEAR REGRESSION USING LEAST MINIMAX
RLMUL	MULTIPLE LINEAR REGRESSION ANALYSIS
RLONE	ANALYSIS OF A SIMPLE LINEAR REGRESSION MODEL
RLOPDC	RESPONSE PREDICTION USING AN ORTHOGONAL POLYNOMIAL REGRESSION MODEL
RLPOL	GENERATE ORTHOGONAL POLYNOMIALS WITH THE ASSOCIATED CONSTANTS AA AND BB
RLPRDI	CONFIDENCE INTERVALS FOR THE TRUE RESPONSE AND FOR THE AVERAGE OF A SET OF FUTURE OBSERVATIONS ON THE RESPONSE (IN-CORE VERSION)
RLPRDO	CONFIDENCE INTERVALS FOR THE TRUE RESPONSE AND FOR THE AVERAGE OF A SET OF FUTURE OBSERVATIONS ON THE RESPONSE (OUT-OF-CORE VERSION)
RLRES	PERFORM A RESIDUAL ANALYSIS FOR A FITTED REGRESSION MODEL
RLSEP	SELECTION OF A REGRESSION MODEL USING A FORWARD STEPWISE ALGORITHM, AND COMPUTATION OF THE USUAL ANALYSIS OF VARIANCE TABLE ENTRIES - EASY TO USE VERSION
RLSTP	REGRESSION MODEL SELECTION USING A FORWARD STEPWISE ALGORITHM WITH RESULTS AVAILABLE AFTER EACH STEP
RLSUBM	RETRIEVAL OF A SYMMETRIC SUBMATRIX FROM A MATRIX STORED IN SYMMETRIC STORAGE MODE BY RLSTP
RLSUM	REORDERING OF THE ROWS AND CORRESPONDING COLUMNS OF A SYMMETRIC MATRIX STORED IN SYMMETRIC STORAGE MODE
RSMITZ	LEAST SQUARES FIT OF THE NON-LINEAR REGRESSION MODEL Y(I) = ALPHA+BETA*GAMMA**X(I)+E(I)
SASUM	COMPUTE SINGLE PRECISION SUM OF ABSOLUTE VALUES (VBLA=SASUM)
SAXPY	COMPUTE A CONSTANT TIMES A VECTOR PLUS A VECTOR, ALL SINGLE PRECISION (VBLA=SAXPY)
SCASUM	COMPUTE COMPLEX SUM OF ABSOLUTE VALUES (VBLA=SCASUM)
SCNRM2	COMPUTE THE EUCLIDEAN LENGTH OR L2 NORM OF A COMPLEX VECTOR (VBLA=SCNRM2)
SCOPY	COPY A VECTOR X TO A VECTOR Y, BOTH SINGLE PRECISION (VBLA=SCOPY)
SDOT	COMPUTE SINGLE PRECISION DOT PRODUCT (VBLA=SDOT)
SDSDOT	COMPUTE SINGLE PRECISION DOT PRODUCT AND ADD A CONSTANT USING DOUBLE PRECISION ACCUMULATION (VBLA=SDSDOT)

SNRM2	COMPUTE THE EUCLIDEAN LENGTH OR L2 NORM OF A SINGLE PRECISION VECTOR (VBLA=SNRM2)
SROT	APPLY GIVENS PLANE ROTATION (SINGLE PRECISION) (VBLA=SROT)
SROTG	CONSTRUCT GIVENS PLANE ROTATION (SINGLE PRECISION) (VBLA=SROTG)
SROTM	APPLY A MODIFIED GIVENS PLANE ROTATION (SINGLE PRECISION) (VBLA=SROTM)
SROTMG	CONSTRUCT A MODIFIED GIVENS PLANE ROTATION (SINGLE PRECISION) (VBLA=SROTMG)
SSCAL	COMPUTE A SINGLE PRECISION CONSTANT TIMES A SINGLE PRECISION VECTOR (VBLA=SSCAL)
SSPAND	SIMPLE RANDOM SAMPLING WITH PROPORTION DATA-INFERENCES REGARDING THE POPULATION PROPORTION AND TOTAL
SSPBLK	STRATIFIED RANDOM SAMPLING WITH PROPORTION DATA - INFERENCES REGARDING THE POPULATION PROPORTION AND TOTAL
SSRAND	SIMPLE RANDOM SAMPLING WITH CONTINUOUS DATA - INFERENCES REGARDING THE POPULATION MEAN AND TOTAL USING RATIO OR REGRESSION ESTIMATION
SSRBLK	STRATIFIED RANDOM SAMPLING WITH CONTINUOUS DATA-INFERENCES REGARDING THE POPULATION MEAN AND TOTAL USING RATIO OR REGRESSION ESTIMATION
SSSAND	SIMPLE RANDOM SAMPLING WITH CONTINUOUS DATA - INFERENCES REGARDING THE POPULATION MEAN AND TOTAL
SSSBLK	STRATIFIED RANDOM SAMPLING WITH CONTINUOUS DATA - INFERENCES REGARDING THE POPULATION MEAN AND TOTAL
SSSCAN	SINGLE STAGE CLUSTER SAMPLING WITH CONTINUOUS DATA - INFERENCES REGARDING THE POPULATION MEAN AND TOTAL
SSSEST	TWO-STAGE SAMPLING WITH CONTINUOUS DATA AND EQUISIZED PRIMARY UNITS - INFERENCES REGARDING THE POPULATION MEAN AND TOTAL
SSWAP	INTERCHANGE VECTORS X AND Y, BOTH SINGLE PRECISION (VBLA=SSWAP)
UERSET	SET MESSAGE LEVEL FOR IMSL ROUTINE UERTST
UERTST	PRINT A MESSAGE REFLECTING AN ERROR CONDITION
UGETIO	TO RETRIEVE CURRENT VALUES AND TO SET NEW VALUES FOR INPUT AND OUTPUT UNIT IDENTIFIERS
UHELP	DISPLAY METHODS OF OBTAINING INFORMATION ON IMSL CONVENTIONS REGARDING VARIOUS SUBJECTS AND PROVIDE A MEANS FOR INDIVIDUAL SITES TO SUPPLY USERS WITH SITE SPECIFIC INFORMATION

UHELP1	WRITE INFORMATION REGARDING IMSL CONVENTIONS AND NOTATION TO AN OUTPUT FILE
UHELP2	WRITE INFORMATION REGARDING IMSL INPUT AND OUTPUT CONVENTIONS
UHELP3	WRITE INFORMATION REGARDING IMSL ERROR DETECTING FACILITIES
UHELP4	WRITE INFORMATION REGARDING MATRIX/VECTOR STORAGE MODES USED IN IMSL SUBROUTINES
USBOX	PRINT BOXPLOT
USCRDM	READ A MATRIX (OPTIONAL SEQUENCE CHECK)
USHIST	PRINT A HISTOGRAM (VERTICAL)
USHIUT	PRINT A HISTOGRAM, PLOTTING TWO FREQUENCIES WITH ONE BAR OF THE HISTOGRAM (VERTICAL)
USHV1	PRINT A HISTOGRAM (HORIZONTAL)
USLEAP	PRINT RESULTS OF THE BEST-REGRESSIONS ANALYSIS PERFORMED BY IMSL ROUTINE RLEAP
USMNMX	DETERMINATION OF THE MINIMUM AND MAXIMUM VALUES OF A VECTOR
USPC	PRINT A SAMPLE PDF, A THEORETICAL PDF AND CONFIDENCE BAND INFORMATION WITH OPTIONAL PLOT
USPDF	PLOT OF TWO SAMPLE PROBABILITY DISTRIBUTION FUNCTIONS AGAINST THEIR SPECTRA
USPLT	PRINTER PLOT OF UP TO TEN FUNCTIONS
USRDM	READ A MATRIX
USRDV	READ A VECTOR
USSLF	PRINT STEM AND LEAF DISPLAY
USTREE	PRINT A BINARY TREE (WHICH MAY REPRESENT THE OUTPUT OF A CLUSTERING ALGORITHM IN CHAPTER O)
USWBM	PRINT A MATRIX STORED IN BAND STORAGE MODE
USWBS	PRINT A MATRIX STORED IN BAND SYMMETRIC STORAGE MODE
USWFM	PRINT A MATRIX STORED IN FULL STORAGE MODE
USWFV	PRINT A VECTOR
USWSM	PRINT A MATRIX STORED IN SYMMETRIC STORAGE MODE
VABMXF	MAXIMUM ABSOLUTE VALUE OF THE ELEMENTS OF A VECTOR OR A SUBSET OF THE ELEMENTS OF A VECTOR (FULL STORAGE MODE)

VABMXS	MAXIMUM ABSOLUTE VALUE OF THE ELEMENTS OF A ROW OR COLUMN OF A MATRIX STORED (SYMMETRIC STORAGE MODE)
VABSMF	SUM OF THE ABSOLUTE VALUES OF THE ELEMENTS OF A VECTOR OR A SUBSET OF A VECTOR (FULL STORAGE MODE)
VABSMS	SUM OF THE ABSOLUTE VALUES OF THE ELEMENTS OF A ROW (OR COLUMN) OF A MATRIX STORED (SYMMETRIC STORAGE MODE)
VBLA	PACKAGE OF 38 LINEAR ALGEBRA ROUTINES
VCONVO	VECTOR CONVOLUTION
VCVTBF	STORAGE MODE CONVERSION OF MATRICES (BAND TO FULL STORAGE MODE)
VCVTCH	STORAGE MODE CONVERSION OF MATRICES (FULL COMPLEX TO HERMITIAN)
VCVTFB	STORAGE MODE CONVERSION OF MATRICES (FULL TO BAND STORAGE MODE)
VCVTFQ	STORAGE MODE CONVERSION (FULL TO BAND SYMMETRIC STORAGE MODE)
VCVTFS	STORAGE MODE CONVERSION OF MATRICES (FULL TO SYMMETRIC)
VCVTHC	STORAGE MODE CONVERSION OF MATRICES (HERMITIAN TO FULL COMPLEX)
VCVTQF	STORAGE MODE CONVERSION (BAND SYMMETRIC TO FULL STORAGE MODE)
VCVTQS	STORAGE MODE CONVERSION (BAND SYMMETRIC TO SYMMETRIC STORAGE MODE)
VCVTSF	STORAGE MODE CONVERSION OF MATRICES (SYMMETRIC TO FULL)
VCVTSQ	STORAGE MODE CONVERSION (SYMMETRIC TO BAND SYMMETRIC STORAGE MODE)
VDCPS	DECOMPOSE AN INTEGER INTO ITS PRIME FACTORS
VHSH2C	COMPLEX HOUSEHOLDER TRANSFORMATION TO ZERO A SINGLE ELEMENT OF A MATRIX
VHSH2R	REAL HOUSEHOLDER TRANSFORMATION TO ZERO A SINGLE ELEMENT OF A MATRIX
VHSH3R	REAL HOUSEHOLDER TRANSFORMATION TO ZERO TWO ELEMENTS OF A MATRIX
VHS12	REAL HOUSEHOLDER TRANSFORMATION - COMPUTATION AND APPLICATIONS
VIPRFF	VECTOR INNER PRODUCT OF TWO VECTORS OR SUBSETS OF TWO VECTORS
VIPRSS	VECTOR INNER PRODUCT OF TWO VECTORS EACH OF WHICH IS PART OF SOME MATRIX STORED IN SYMMETRIC MODE

VMULBB	MATRIX MULTIPLICATION (BAND STORAGE MODE)
VMULBF	MATRIX MULTIPLICATION (BAND BY FULL MATRICES)
VMULBS	MATRIX MULTIPLICATION (BAND BY SYMMETRIC
VMULFB	MATRIX MULTIPLICATION (FULL BY BAND MATRICES)
VMULFF	MATRIX MULTIPLICATION (FULL STORAGE MODE)
VMULFM	MATRIX MULTIPLICATION OF THE TRANSPOSE OF MATRIX A BY MATRIX B (FULL STORAGE MODE)
VMULFP	MATRIX MULTIPLICATION OF MATRIX A BY THE TRANSPOSE OF MATRIX B (FULL STORAGE MODE)
VMULFQ	MATRIX MULTIPLICATION (FULL BY BAND SYMMETRIC MATRICES)
VMULFS	MATRIX MULTIPLICATION (FULL BY SYMMETRIC MATRICES)
VMULQB	MATRIX MULTIPLICATION (BAND SYMMETRIC BY BAND MATRICES)
VMULQF	MATRIX MULTIPLICATION (BAND SYMMETRIC BY FULL MATRICES)
VMULQQ	MATRIX MULTIPLICATION (BAND SYMMETRIC STORAGE MODE)
VMULQS	MATRIX MULTIPLICATION (BAND SYMMETRIC BY SYMMETRIC MATRICES)
VMULSB	MATRIX MULTIPLICATION (SYMMETRIC BY BAND MATRICES)
VMULSF	MATRIX MULTIPLICATION (SYMMETRIC BY FULL MATRICES)
VMULSQ	MATRIX MULTIPLICATION (SYMMETRIC BY BAND SYMMETRIC MATRICES)
VMULSS	MATRIX MULTIPLICATION (SYMMETRIC STORAGE MODE)
VNRMFI	INFINITY-NORM MATRICES (FULL STORAGE MODE)
VNRMF1	1-NORM OF MATRICES (FULL STORAGE MODE)
VNRMF2	EUCLIDEAN-NORM OF MATRICES (FULL STORAGE MODE)
VNRMS1	1-NORM OF MATRICES (SYMMETRIC STORAGE MODE)
VNRMS2	EUCLIDEAN-NORM OF MATRICES (SYMMETRIC STORAGE MODE)
VPOLYF	MATRIX POLYNOMIAL (FULL STORAGE MODE)
VSRTA	SORTING OF ARRAYS BY ALGEBRAIC VALUE
VSRTM	SORTING OF ARRAYS BY ABSOLUTE VALUE
VSRTP	SORTING OF ARRAYS BY ABSOLUTE VALUE - PERMUTATIONS RETURNED
VSRTR	SORTING OF ARRAYS BY ALGEBRAIC VALUE - PERMUTATIONS RETURNED

VSRTU	INTERCHANGE THE ROWS OR COLUMNS OF A MATRIX USING A PERMUTATION VECTOR SUCH AS THE ONE OBTAINED FROM IMSL ROUTINES VSRTP OR VSRTR
VTPROF	TRANSPOSE PRODUCT OF MATRIX (FULL STORAGE MODE)
VTPROS	TRANSPOSE PRODUCT OF A MATRIX (SYMMETRIC STORAGE MODE)
VTRAN	TRANSPOSE A RECTANGULAR MATRIX
VUABQ	MATRIX ADDITION (BAND + BAND SYMMETRIC MATRICES)
VUAFB	MATRIX ADDITION (FULL + BAND MATRICES)
VUAFQ	MATRIX ADDITION (FULL + BAND SYMMETRIC MATRICES)
VUAFS	MATRIX ADDITION (FULL + SYMMETRIC MATRICES)
VUASB	MATRIX ADDITION (SYMMETRIC + BAND MATRICES)
VUASQ	MATRIX ADDITION (SYMMETRIC + BAND SYMMETRIC MATRICES)
ZANLYT	ZEROS OF AN ANALYTIC COMPLEX FUNCTION USING THE MULLER METHOD WITH DEFLATION
ZBRENT	ZERO OF A FUNCTION WHICH CHANGES SIGN IN A GIVEN INTERVAL (BRENT ALGORITHM)
ZCPOLY	ZEROS OF A POLYNOMIAL WITH COMPLEX COEFFICIENTS (JENKINS-TRAUB)
ZFALSE	ZERO OF A FUNCTION GIVEN AN INTERVAL CONTAINING THE ZERO
ZPOLR	ZEROS OF A POLYNOMIAL WITH REAL COEFFICIENTS (LAGUERRE)
ZQADC	ZEROS OF A QUADRATIC WITH COMPLEX COEFFICIENTS
ZQADR	ZEROS OF A QUADRATIC WITH REAL COEFFICIENTS
ZREAL1	THE REAL ZEROS OF A REAL FUNCTION - TO BE USED WHEN INITIAL GUESSES ARE POOR
ZREAL2	THE REAL ZEROS OF A REAL FUNCTION - TO BE USED WHEN INITIAL GUESSES ARE GOOD
ZRPOLY	ZEROS OF A POLYNOMIAL WITH REAL COEFFICIENTS (JENKINS-TRAUB)
ZSCNT	SOLVE SYSTEM OF NONLINEAR EQUATIONS BY SECANT METHOD
ZSRCH	GENERATE POINTS IN AN N DIMENSIONAL SPACE
ZSYSTM	DETERMINATION OF A ROOT OF A SYSTEM OF N SIMULTANEOUS NONLINEAR EQUATIONS IN N UNKNOWNS
ZXCGR	A CONJUGATE GRADIENT ALGORITHM FOR FINDING THE MINIMUM OF A FUNCTION OF N VARIABLES

ZXGSN	ONE-DIMENSIONAL UNIMODAL FUNCTION MINIMIZATION USING THE GOLDEN SECTION SEARCH METHOD
ZXGSP	ONE-DIMENSIONAL UNIMODAL FUNCTION MINIMIZATION USING THE GOLDEN SECTION SEARCH METHOD - DATA PARAMETERS SPECIFIED
ZXMIN	MINIMUM OF A FUNCTION OF N VARIABLES USING A QUASI-NEWTON METHOD
ZXSSQ	MINIMUM OF THE SUM OF SQUARES OF M FUNCTIONS IN N VARIABLES USING A FINITE DIFFERENCE LEVENBERG-MARQUARDT ALGORITHM
ZX0LP	SOLVE THE LINEAR PROGRAMMING PROBLEM (PHASE ONE OR PHASE TWO) VIA THE REVISED SIMPLEX ALGORITHM
ZX3LP	SOLVE THE LINEAR PROGRAMMING PROBLEM VIA THE REVISED SIMPLEX ALGORITHM (EASY TO USE VERSION)
ZX4LP	SOLVE THE LINEAR PROGRAMMING PROBLEM VIA THE REVISED SIMPLEX ALGORITHM USING ORTHOGONAL DECOMPOSITION (EASY TO USE VERSION)

*** LINPACK ***

LINPACK IS A PACKAGE OF 40 SUBROUTINES TO ANALYZE AND SOLVE VARIOUS CLASSES OF SYSTEMS OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS WHICH WAS OBTAINED FROM ARGONNE NATIONAL LABORATORY. BESIDE THE SINGLE PRECISION PACKAGE VERSIONS FOR COMPLEX OR DOUBLE PRECISION EXIST. ROUTINES ARE INCLUDED FOR GENERAL, BANDED, SYMMETRIC INDEFINITE, SYMMETRIC POSITIVE DEFINITE, TRIANGULAR, AND TRIDIAGONAL SQUARE MATRICES PLUS LEAST SQUARE PROBLEMS AND QR AND SINGLE VALUE DECOMPOSITIONS OF RECTANGULAR MATRICES. THE PACKAGE ALSO INCLUDES 11 BASIC LINEAR ALGEBRA SUBPROGRAMS.

REFERENCE: "LINPACK USERS' GUIDE", J. J. DONGARA, J. R. BUNCH, C. D. MOLER, G. W. STEWART, SIAM, 1979.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'LINPACK' INCLUDE:

SCHDC COMPUTES THE CHOLESKY DECOMPOSITION OF A POSITIVE DEFINITE MATRIX. A PIVOTING OPTION ALLOWS THE USER TO ESTIMATE THE CONDITION OF A POSITIVE DEFINITE MATRIX OR DETERMINE THE RANK OF A POSITIVE SEMIDEFINITE MATRIX.

SCHDD DOWNDATES AN AUGMENTED CHOLESKY DECOMPOSITION OR THE TRIANGULAR FACTOR OF AN AUGMENTED QR DECOMPOSITION.

SCHEX UPDATES THE CHOLESKY FACTORIZATION A = TRANS(R)*R OF A POSITIVE DEFINITE MATRIX A OF ORDER P UNDER DIAGONAL PERMUTATIONS OF THE FORM TRANS(E)*A*E WHERE E IS A PERMUTATION MATRIX.

SCHUD UPDATES AN AUGMENTED CHOLESKY DECOMPOSITION OF THE TRIANGULAR PART OF AN AUGMENTED QR DECOMPOSITION.

SGBCO FACTORS A REAL BAND MATRIX BY GAUSSIAN ELIMINATION AND ESTIMATES THE CONDITION OF THE MATRIX.

SGBDI COMPUTES THE DETERMINANT OF A BAND MATRIX USING THE FACTORS COMPUTED BY SGBCO OR SGBFA.

SGBFA FACTORS A REAL BAND MATRIX BY ELIMINATION.

SGBSL SOLVES THE REAL BAND SYSTEM A * X = B OR TRANS(A) * X = B USING THE FACTORS COMPUTED BY SGBCO OR SGBFA.

SGECO FACTORS A REAL MATRIX BY GAUSSIAN ELIMINATION AND ESTIMATES THE CONDITION OF THE MATRIX.

SGEDI COMPUTES THE DETERMINANT AND INVERSE OF A MATRIX USING THE FACTORS COMPUTED BY SGECO OR SGEFA.

SGEFA FACTORS A REAL MATRIX BY GAUSSIAN ELIMINATION.

SGESL SOLVES THE REAL SYSTEM A * X = B OR TRANS(A) * X = B USING THE FACTORS COMPUTED BY SGECO OR SGEFA.

SGTSL GIVEN A GENERAL TRIDIAGONAL MATRIX AND A RIGHT HAND SIDE WILL FIND THE SOLUTION.

SPBCO FACTORS A REAL SYMMETRIC POSITIVE DEFINITE MATRIX STORED IN

SPBDI COMPUTES THE DETERMINANT OF A REAL SYMMETRIC POSITIVE DEFINITE BAND MATRIX USING THE FACTORS COMPUTED BY SPBCO OR SPBFA.

SPBFA FACTORS A REAL SYMMETRIC POSITIVE DEFINITE MATRIX STORED IN BAND FORM.

SPBSL SOLVES THE REAL SYMMETRIC POSITIVE DEFINITE BAND SYSTEM A*X = B USING THE FACTORS COMPUTED BY SPBCO OR SPBFA.

SPOCO FACTORS A REAL SYMMETRIC POSITIVE DEFINITE MATRIX AND ESTIMATES THE CONDITION OF THE MATRIX.

SPODI COMPUTES THE DETERMINANT AND INVERSE OF A CERTAIN REAL SYMMETRIC POSITIVE DEFINITE MATRIX (SEE BELOW) USING THE FACTORS COMPUTED BY SPOCO, SPOFA OR SQRDC.

SPOFA FACTORS A REAL SYMMETRIC POSITIVE DEFINITE MATRIX.

SPOSL SOLVES THE REAL SYMMETRIC POSITIVE DEFINITE SYSTEM A * X = B USING THE FACTORS COMPUTED BY SPOCO OR SPOFA.

SPPCO FACTORS A REAL SYMMETRIC POSITIVE DEFINITE MATRIX STORED IN PACKED FORM AND ESTIMATES THE CONDITION OF THE MATRIX.

SPPDI COMPUTES THE DETERMINANT AND INVERSE OF A REAL SYMMETRIC POSITIVE DEFINITE MATRIX USING THE FACTORS COMPUTED BY SPPCO OR SPPFA.

SPPFA FACTORS A REAL SYMMETRIC POSITIVE DEFINITE MATRIX STORED IN PACKED FORM.

SPPSL SOLVES THE REAL SYMMETRIC POSITIVE DEFINITE SYSTEM A * X = B USING THE FACTORS COMPUTED BY SPPCO OR SPPFA.

SPTSL GIVEN A POSITIVE DEFINITE TRIDIAGONAL MATRIX AND A RIGHT HAND SIDE WILL FIND THE SOLUTION.

SQRDC USES HOUSEHOLDER TRANSFORMATIONS TO COMPUTE THE QR FACTORIZATION OF AN N BY P MATRIX X. COLUMN PIVOTING BASED ON THE 2-NORMS OF THE REDUCED COLUMNS MAY BE PERFORMED AT THE USERS OPTION.

SQRSL APPLIES THE OUTPUT OF SQRDC TO COMPUTE COORDINATE TRANSFORMATIONS, PROJECTIONS, AND LEAST SQUARES SOLUTIONS.

SSICO FACTORS A REAL SYMMETRIC MATRIX BY ELIMINATION WITH SYMMETRIC PIVOTING AND ESTIMATES THE CONDITION OF THE MATRIX.

SSIDI COMPUTES THE DETERMINANT, INERTIA AND INVERSE OF A REAL SYMMETRIC MATRIX USING THE FACTORS FROM SSIFA.

SSIFA FACTORS A REAL SYMMETRIC MATRIX BY ELIMINATION WITH SYMMETRIC PIVOTING.

SSISL SOLVES THE REAL SYMMETRIC SYSTEM A * X = B USING THE FACTORS COMPUTED BY SSIFA.

SSPCO FACTORS A REAL SYMMETRIC MATRIX STORED IN PACKED FORM BY ELIMINATION WITH SYMMETRIC PIVOTING AND ESTIMATES THE CONDITION OF THE MATRIX.

SSPDI COMPUTES THE DETERMINANT, INERTIA AND INVERSE OF A REAL SYMMETRIC MATRIX USING THE FACTORS FROM SSPFA, WHERE THE MATRIX IS STORED IN PACKED FORM.

SSPFA FACTORS A REAL SYMMETRIC MATRIX STORED IN PACKED FORM BY ELIMINATION WITH SYMMETRIC PIVOTING.

SSISL SOLVES THE REAL SYMMETRIC SYSTEM A * X = B USING THE FACTORS COMPUTED BY SSPFA.

SSVDC REDUCES A REAL NXP MATRIX X BY ORTHOGONAL TRANSFORMATIONS U AND V TO DIAGONAL FORM.

STRCO ESTIMATES THE CONDI ION OF A REAL TRIANGULAR MATRIX.

STRDI COMPUTES THE DETERMINANT AND INVERSE OF A REAL TRIANGULAR MATRIX.

STRSL SOLVES SYSTEMS OF THE FORM T * X = B OR TRANS(T) * X = B WHERE T IS A TRIANGULAR MATRIX OF ORDER N.

*** MINPACK ***

MINPACK IS A PACKAGE OF 23 FORTRAN SUBPROGRAMS (11 ARE USER-CALLABLE) TO SOLVE NON-LINEAR EQUATIONS AND NON-LINEAR LEAST SQUARES PROBLEMS. IT WAS OBTAINED FROM ARGONNE NATIONAL LABORATORY.

REFERENCES: ANL-80-74

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

USER-CALLABLE ROUTINES IN LIBRARY 'MINPACK' INCLUDE:

CHKDER CHECK THE GRADIENTS OF M NONLINEAR FUNCTIONS IN N VARIABLES, EVALUATED AT A POINT X, FOR CONSISTENCY WITH THE FUNCTIONS THEMSELVES

HYBRD FIND A ZERO OF A SYSTEM OF N NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE POWELL HYBRID METHOD

HYBRD1 FIND A ZERO OF A SYSTEM OF N NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE POWELL HYBRID METHOD

HYBRJ FIND A ZERO OF A SYSTEM OF N NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE POWELL HYBRID METHOD

HYBRJ1 FIND A ZERO OF A SYSTEM OF N NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE POWELL HYBRID METHOD

LMDER MINIMIZE THE SUM OF THE SQUARES OF M NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE LEVELBERG-MARQUARDT ALGORITHM

LMDER1 MINIMIZE THE SUM OF THE SQUARES OF M NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE LEVELBERG-MARQUARDT ALGORITHM

LMSTR MINIMIZE THE SUM OF THE SQUARES OF M NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE LEVELBERG-MARQUARDT WHICH USES MINIMAL STORAGE

LMSTR1 MINIMIZE THE SUM OF THE SQUARES OF M NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE LEVELBERG-MARQUARDT ALGORITHM WHICH USES MINIMAL STORAGE

LMDIF MINIMIZE THE SUM OF THE SQUARES OF M NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE LEVELBERG-MARQUARDT ALGORITHM

LMDIF1 MINIMIZE THE SUM OF THE SQUARES OF M NON-LINEAR FUNCTIONS IN N VARIABLES BY A MODIFICATION OF THE LEVELBERG-MARQUARDT ALGORITHM

*** MSL ***
(PROPRIETARY)

THE CDC MATH SCIENCE LIBRARY CONTAINS OVER 300 NUMERICAL MATHEMATICAL ROUTINES COVERING THE FOLLOWING EIGHT AREAS:

- .PROGRAMMED ARITHMETIC
- .ELEMENTARY FUNCTIONS
- .POLYNOMIALS AND SPECIAL FUNCTIONS
- .ORDINARY DIFFERENTIAL EQUATIONS
- .INTERPOLATION, APPROXIMATION AND QUADRATURE
- .LINEAR ALGEBRA
- .PROBABILITY, STATISTICS AND TIME SERIES
- .NONLINEAR EQUATION SOLVERS

REFERENCE: MATH SCIENCE LIBRARY, VOLUMES 1-8, CDC PUBLICATION NUMBER 60327500.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'MSL' INCLUDE:

ACFI	SINGLE CONTINUED FRACTION INTERPOLATION ON TABULAR DATA WITH ARBITRARY SPACING
ADR	ADD COEFFICIENTS OF LIKE POWERS OF TWO REAL POYLNOMIALS
AITKEN	AITKEN'S INTERPOLATION OF ORDER N-1 (ORDER RANGE FROM 1-9)
AMCON	PROVIDE CERTAIN MACHINE AND MATHEMATICAL CONSTANTS AS SINGLE PRECISION NUMBERS OF MAXIMUM ACCURACY
ATSM	SELECT A SUBTABLE ORDERED, ACCORDING TO PROXIMITY, OF THOSE POINTS THAT HAVE ABSCISSAE CLOSEST TO A GIVEN VALUE, FROM A MONOTONE ORDERED TABLE
BALANC	BALANCE A COMPLEX MATRIX BY THE USE OF DIAGONAL SIMILARITY TRANSFORMATIONS
BANEIG	DETERMINE A SPECIFIED NUMBER OF THE SMALLEST EIGENVALUES AND ASSOCIATED EIGENVECTORS OF THE ALGEBRAIC EIGENVALUE PROBLEM A*VI=LAMBDA*B*VI WHERE A IS A SYMMETRIC, NONNEGATIVE DEFINITE, NARROW BAND MATRIX AND B IS A POSITIVE DEFINITE DIAGONAL MATRIX
BCHSDC	DECOMPOSE A REAL, SYMMETRIC POSITIVE BAND MATRIX INTO (BANDED) UPPER AND LOWER TRIANGULAR FACTORS
BDCWNP	DECOMPOSE A BANDED MATRIX INTO BANDED LOWER AND UPPER TRIANGULAR FACTORS WITH NO PIVOTING
BDECOM	DECOMPOSE A BANDED MATRIX B INTO BANDED LOWER AND UPPER TRIANGULAR FACTORS L AND U, WITH IMPLICIT EQUILIBRATION AND PARTIAL PIVOTING
BESNIS	EVALUATE A TABLE FOR THE BESSEL FUNCTION I(X) FOR N=0,1,2,3,...,J-1

BESNKS EVALUATE A TABLE OF VALUES OF THE BESSEL FUNCTION K(X)

BETAR COMPUTE INCOMPLETE BETA RATIO (OF THE INCOMPLETE BETA FUNCTION AT X,P,Q TO THE COMPLETE BETA FUNCTION AT P,Q)

BFBANP SOLVE LY=B AND UX=Y BY BACK SUBSTITUTIONS - WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS AND, L AND U ARE LOWER AND UPPER TRIANGULAR FACTORS, POSSIBLY OBTAINED FROM BDCWNP

BFBSUM SOLVE LY=B AND UX=Y BY BACK SUBSTITUTIONS - WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS AND, L AND U ARE LOWER AND UPPER TRIANGULAR MATRICES OBTAINED FROM BDECOM

BITERM SOLVE A SYSTEM OF LINEAR EQUATIONS WITH ITERATIVE REFINEMENT FOR SYSTEMS HAVING A BAND COEFFICIENT MATRIX

BITRFM SOLVE, WITH ITERATIVE REFINEMENT, A SYSTEM OF LINEAR EQUATIONS HAVING A BAND COEFFICIENT MATRIX

BITRNP SOLVE, WITH ITERATIVE REFINEMENT, A SYSTEM OF LINEAR EQUATIONS HAVING A BAND COEFFICIENT MATRIX

BITRPD SOLVE A SYSTEM OF LINEAR EQUATIONS WITH ITERATIVE REFINEMENT, GIVEN THE TRIANGULAR DECOMPOSITION

BITWNP SOLVE, WITH ITERATIVE REFINEMENT, A SYSTEM OF LINEAR EQUATIONS HAVING A BAND COEFFICIENT MATRIX

BLCKDQ SOLVE A SYSTEM OF FIRST ORDER DIFFERENTIAL EQUATIONS AT A POINT B, GIVEN THE (INITIAL) VALUES AT A POINT A

BLESOM SOLVE A SYSTEM OF N LINEAR EQUATIONS (WITH M RIGHT-HAND SIDES), HAVING A BAND COEFFICIENT MATRIX

BLSWNP SOLVE A SYSTEM OF LINEAR EQUATIONS (WITH SEVERAL RIGHT-HAND SIDES), HAVING A BAND COEFFICIENT MATRIX, USING NO PIVOTING

BPDITM SOLVE A SYSTEM OF LINEAR EQUATIONS WITH ITERATIVE REFINEMENT - A BANDED, SYMMETRIC SYSTEM WITH POSITIVE DEFINITENESS

BPDSFB SOLVE LY=B AND LTX=Y BY BACK SUBSTIUTIONS - WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS AND L AND LT ARE THE LOWER TRIANGULAR FACTOR AND ITS TRANSPOSE POSSIBLY OBTAINED FROM BCHSDC

BPDSOM SOLVE A POSITIVE DEFINITE SYMMETRIC BAND SYSTEM OF EQUATIONS HAVING M RIGHT-HAND SIDES

BRTLTT COMPUTE THE TEST STATISTIC FOR BARTLETT'S TEST OF HOMOGENEITY OF A GROUP OF VARIANCE ESTIMATES AND DETERMINE THE PROBABILITY OF OBTAINING A VALUE FOR THE TEST STATISTIC LESS THAN THAT OBSERVED

BSJ EVALUATE THE SPHERICAL BESSEL FUNCTION J(X) FOR N=-1,0,...,I

BSUBHT FIND A LEAST SQUARES SOLUTION TO AN OVERDETERMINED SYSTEM THAT HAS BEEN DECOMPOSED USING HOUSEHOLDER TRANSFORMATIONS

BVP	SOLVE NONLINEAR P-POINT BOUNDARY VALUE PROBLEM IN ORDINARY DIFFERENTIAL EQUATIONS
CADR	ADD COEFFICIENTS OF LIKE POWERS OF TWO COMPLEX POLYNOMIALS
CBAREX	EVALUATE C**R FOR C A COMPLEX NUMBER AND R A REAL NUMBER
CCOMPE	EVALUATE A POLYNOMIAL HAVING COMPLEX COEFFICIENTS AT A COMPLEX POINT
CCONGR	SOLVE THE RECTANGULAR SYSTEM AX-BAR=B-BAR IN THE LEAST SQUARES SENSE, IF NO EXACT SOLUTION EXISTS - A, B-BAR, X-BAR ARE COMPLEX
CDECOM	DECOMPOSE A COMPLEX SQUARE MATRIX INTO POWER AND UPPER TRIANGULAR MATRICES WITH PARTIAL PIVOTING AND ROW EQUILIBRATION
CDERIV	GIVEN THE COMPLEX COEFFICIENTS OF A POLYNOMIAL, COMPUTE THE COMPLEX COEFFICIENTS OF THE DERIVATIVE POLYNOMIAL
CEL3	COMPUTE THE COMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND
CFBSUM	SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS, WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS WITH COMPLEX ELEMENTS, AND L AND U ARE LOWER AND UPPER TRIANGULAR MATRICES OBTAINED FROM CDECOM
CFQME	CONSTRUCT THE MINIMAX POLYNOMIAL THROUGH A DISCRETE, WEIGHTED, SET OF POINTS
CGITRF	SOLVE A COMPLEX SYSTEM OF LINEAR EQUATIONS HAVING M RIGHT-HAND SIDE COMPLEX COLUMN VECTORS WITH ITERATIVE REFINEMENT
CGLESM	SOLVE A COMPLEX SYSTEM OF LINEAR EQUATIONS HAVING M RIGHT-HAND SIDES
CHEBAP	FIND A CLOSE APPROXIMATION TO A MINIMAX FIT OF A GIVEN FUNCTION OVER A GIVEN INTERVAL
CHEBEV	EVALUATE A CHEBYCHEV POLYNOMIAL AT A GIVEN POINT
CHIDST	PERFORM THE CHI-SQUARE DISTRIBUTION TEST
CHIPRB	COMPUTE THE PROBABILITY OF OBTAINING A VALUE OF CHI-SQUARE WHICH IS LESS THAN OR EQUAL TO THE GIVEN VALUE CHI-SQUARE
CHIRAB	PERFORM A CHI-SQUARE TEST FOR RUNS ABOVE AND BELOW ZERO - TESTS HYPOTHESIS THAT A SAMPLE OF RANDOM VARIABLES IS OBTAINED FROM A POPULATION WHICH IS SYMMETRICALLY DISTRIBUTED ABOUT ZERO
CHIRUD	PERFORM THE CHI-SQUARE TEST FOR RUNS UP AND DOWN
CHSDEC	DECOMPOSE A POSITIVE DEFINITE SYMMETRIC MATRIX INTO A LOWER TRIANGULAR MATRIX AND ITS TRANSPOSE

CHSQO FUNCTION TO COMPUTE THE VALUE OF CHI-SQUARE WHEN GIVEN THE EXPECTED AND OBSERVED FREQUENCIES

CHTOL EVALUATE THE DISTANCE OF A POINT TO A LINE

CINPRD COMPUTE THE INNER PRODUCT OF TWO VECTORS HAVING COMPLEX COEFFICIENTS IN DOUBLE PRECISION

CINT GIVEN THE COMPLEX COEFFICIENTS OF A POLYNOMIAL, COMPUTE THE COEFFICIENTS OF THE INTEGRAL POLYNOMIAL

CITERF SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS WITH ITERATIVE REFINEMENT, WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS HAVING COMPLEX ELEMENTS, AND L AND U ARE LOWER AND UPPER TRIANGULAR MATRICES OBTAINED FROM CDECOM - PROVIDE THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION

CLDIV DIVIDE A POLYNOMIAL WITH COMPLEX COEFFICIENTS BY THE LINEAR EXPRESSION (X+B) WHERE B IS COMPLEX

CMPYR FIND THE PRODUCT OF TWO POLYNOMIALS WHEN ANY OF THE COEFFICIENTS ARE COMPLEX

CNSLVL ESTIMATE THE ERROR PERFORMED IN THE EVALUATION OF A COMPLEX POLYNOMIAL IN THE NEIGHBORHOOD OF ONE OF ITS ROOTS

COMBES COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE FIRST AND SECOND KINDS FOR COMPLEX ARGUMENT AND ORDERS

COMCUB FIND THE SLOPES AT A GIVEN SET OF POINTS OF THE CUBIC SPLINE PASSING THROUGH THE POINTS

COMPEV EVALUATE A REAL POLYNOMIAL AT A COMPLEX POINT

CONRAY PERFORM ARITHMETIC OPERATIONS ON THE OBSERVATIONS OF ONE VARIABLE IN A MULTIPLEXED DATA ARRAY AND A SPECIFIED CONSTANT

CORCOV COMPUTE EITHER THE AUTOCORRELATION COEFFICIENTS OR THE AUTOVARIANCE COEFFICIENTS FOR ONE OF THE VARIABLES IN A MULTIPLEXED DATA ARRAY

COSEVL EVALUATE A COSINE POLYNOMIAL AT A GIVEN POINT

CPDIV PROVIDE THE QUOTIENT AND REMAINDER OBTAINED BY DIVIDING ONE POLYNOMIAL BY ANOTHER - COEFFICIENTS MAY BE COMPLEX

CPOLRT FIND ALL ROOTS OF AN NTH DEGREE POLYNOMIAL HAVING COMPLEX COEFFICIENTS

CPTRAN COORDINATE TRANSLATION SUCH THAT THE POLYNOMIAL P(X) BECOMES P(X+T) - P(X) MAY HAVE COMPLEX COEFFICIENTS.

CQDIV	DIVIDE THE COMPLEX POLYNOMIAL BY THE QUADRATIC EXPRESSION (X**2+B*X+C), B AND C COMPLEX
CREV	REVERSE THE ORDER OF POLYNOMIAL COEFFICIENTS IN AN ARRAY - COEFFICIENTS MAY BE COMPLEX
CSBR	SUBTRACT COEFFICIENTS OF LIKE POWERS OF TWO POLYNOMIALS - COEFFICIENTS MAY BE COMPLEX
CSHRNK	COMPUTE THE COEFFICIENTS OF THE POLYNOMIAL P(AX) FROM THE COEFFICIENTS OF THE POLYNOMIAL P(X) - COMPLEX COEFFICIENTS
CUBIC2	FIT A CUBIC TO TWO POINTS, GIVEN THE SLOPE AT EACH
CURV	EVALUATE THE MERIT FUNCTION FOR A GIVEN DATA SET
DCBHT	REDUCE A GIVEN MATRIX TO UPPER TRIANGULAR FORM BY HOUSEHOLDER TRANSFORMATIONS
DCWNE	DECOMPOSE A SQUARE MATRIX INTO LOWER AND UPPER TRIANGULAR MATRICES WITH PARTIAL PIVOTING BUT WITHOUT ROW EQUILIBRATION
DCWNP	DECOMPOSE A SQUARE MATRIX INTO LOWER AND UPPER TRIANGULAR MATRICES WITHOUT PIVOTING
DECOM	DECOMPOSE A SQUARE MATRIX INTO LOWER AND UPPER TRIANGULAR MATRICES WITH PARTIAL PIVOTING AND ROW EQUILIBRATION
DEIG	SOLVE FOR THE EIGENVALUES AND RIGHT EIGENVECTORS OF THE DYNAMICAL SYSTEM AX..+BX.+CX=0 WHERE A, B, C ARE REAL, BUT OTHERWISE GENERAL, MATRICES
DERIV	GIVEN THE REAL COEFFICIENTS OF A POLYNOMIAL, COMPUTE THE REAL COEFFICIENTS OF THE DERIVATIVE POLYNOMIAL
DETERM	CALCULATE THE DETERMINANT OF A SQUARE MATRIX IN THE FORM D1*(2**D2) USING THE INFORMATION FROM THE SUBROUTINE DECOM
DIFTAB	DIFFERENTIATE NUMERICALLY A FUNCTION GIVEN AS A TABLE WITH EQUISPACED ARGUMENTS
DLETE	REMOVE SPECIFIED OBSERVATIONS FROM A DATA ARRAY
DRATEX	SOLVE NUMERICALLY INITIAL VALUE PROBLEMS IN ORDINARY DIFFERENTIAL EQUATIONS
DSCRPT	COMPUTE MEANS, STANDARD DEVIATIONS, VARIANCES, AND COEFFICIENTS OF SKEWNESS AND KURTOSIS FOR MULTIPLEXED DATA ARRAYS
DSCRP2	DETERMINE THE MEDIAN, MINIMUM, MAXIMUM AND RANGE FOR EITHER A SINGLE VARIABLE IN A MULTIPLEXED DATA ARRAY OR ALL THE VARIABLES IN A MULTIPLEXED DATA ARRAY
DTSHFT	FURNISH A GUESS OF AN EIGENVALUE TO A COMPLEX HESSENBERG MATRIX

EIGCHK	GIVEN AN APPROXIMATE EIGENVALUE/EIGENVECTOR PAIR OF A REAL SYMMETRIC MATRIX A, AND THE MATRIX, AND ESTIMATES OF THE CLOSEST EIGENVALUES TO THE GIVEN EIGENVALUE, PROVIDE ERROR BOUNDS AND POSSIBLY REFINEMENT OF THE EIGENVALUE
EIGCO1	GIVEN AN APPROXIMATION TO AN EIGENVALUE OF A REAL MATRIX HAVING REAL AND DISTINCT ROOTS, CONVERGE TO THE EIGENVALUE-EIGENVECTOR PAIR WHOSE EIGENVALUE IS NEAREST TO THIS APPROXIMATION
EIGIMP	REFINE THE EIGENVECTORS OBTAINED FROM SUBROUTINE EIGVCH (WIELANOT INVERSE ITERATION)
EIGSYM	FIND ALL EIGENVECTORS OF A REAL, SYMMETRIC MATRIX - SUBSET OF EIGENVECTORS MAY ALSO BE FOUND
EIGVCH	COMPUTE THE EIGENVECTORS CORRESPONDING TO A REAL EIGENVALUE OF A REAL UPPER HESSENBERG MATRIX
EIG5	FIND ALL, OR OPTIONALLY A SUBSET OF THE EIGENVALUES OF A GENERAL, REAL-ELEMENTED MATRIX
ELF	EVALUATE THE INCOMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND SECOND KIND
ELK	EVALUATE THE COMPLETE ELLIPTIC INTEGRAMS OF THE FIRST AND SECOND KIND
EL3	COMPUTE THE ELLIPTIC INTEGRAL OF THE THIRD KIND
ERF	COMPUTE THE ERROR FUNCTION
ERFINV	FIND THE INVERSE ERROR FUNCTION - COMPUTE THE UPPER LIMIT OF THE INTEGRAL IN THE ERROR FUNCTION
EVREAL	EVALUATE A POLYNOMIAL HAVING REAL COEFFICIENTS AT A REAL VALUE OF THE INDEPENDENT VARIABLE
EXRAND	GENERATE RANDOM NUMBERS HAVING A NEGATIVE EXPONENTIAL DISTRIBUTION
FABSV	COMPUTE THE VALUE OF THE MODULUS OF A VECTOR
FAFRAC	ADD TWO FRACTIONS AND EXPRESS THE RESULT AS A FRACTION IN ITS LOWEST FORM
FBSUBM	SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS, WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS, AND U AND L ARE LOWER AND UPPER TRIANGULAR MATRICES OBTAINED FROM DECOM
FBSUBS	SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS, WHERE B IS A COLUMN VECTOR, AND U AND L ARE LOWER AND UPPER TRIANGULAR MATRICES OBTAINED FROM DECOM
FCGM2	SOLVE THE RECTANGULAR EQUATION SYSTEM AX-BAR=B-BAR IN THE LEAST SQUARES SENSE, IF NO EXACT SOLUTION EXISTS - A, X-BAR, B-BAR ARE COMPLEX

FCLSQ CONSTRUCT A LEAST SQUARE POLYNOMIAL OF A SPECIFIED DEGREE WHOSE GRAPH APPROXIMATES A SET OF DATA POINTS

FDLSQ CONSTRUCT A LEAST SQUARE POLYNOMIAL APPROXIMATION OF SOME PRE-ASSIGNED DEGREE TO A SET OF DATA POINTS WITH GIVEN WEIGHT WHERE THE POLYNOMIAL IS CONSTRAINED AT N POINTS AND THE DERIVATIVE IS ALSO CONSTRAINED AT THE FIRST M OF THE N POINTS WHERE M <= N

FFRAC CHANGE A VECTOR WITH FRACTIONAL COMPONENTS INTO ONE WITH INTEGER COMPONENTS TIMES A SCALAR FRACTION

FHRNEW CONSTRUCT THE HERMETIAN POLYNOMIAL OF DEGREE N+M+1 THROUGH N+1 COORDINATES WITH DERIVATIVES AT THE FIRST M+1 POINTS

FILTER COMPUTE THE OUTPUTS FROM A MOVING AVERAGE -- AUTOGRESSIVE FILTER - BOTH INPUT AND OUTPUT ARRAYS MAY BE MULTIPLEXED ARRAYS

FITLIN FIND THE BEST FIT LINE - MINIMIZE THE SUM OF THE SQUARES OF THE PERPENDICULAR DISTANCES FROM THE POINTS TO THE LINE

FLGNEW CONSTRUCT THE NTH DEGREE LAGRANGIAN THROUGH N+1 COORDINATES X(I), AF(I)

FLSQFY FIND A LEAST SQUARES POLYNOMIAL OF SPECIFIED DEGREE WHOSE GRAPH APPROXIMATES A SET OF DATA POINTS

FMFRAC MULTIPLY TWO FRACTIONS AND EXPRESS THE RESULT AS A FRACTION IN ITS LOWEST TERMS

FMMX MATRIX-MATRIX MULTIPLICATION

FMTMX MULTIPLY THE TRANSPOSE OF A MATRIX BY A MATRIX ON THE RIGHT

FMTR TRANSPOSE AN M BY N MATRIX

FMTVCX MULTIPLY THE TRANSPOSE OF A COMPLEX MATRIX ON THE RIGHT BY A COMPLEX VECTOR

FMTVX MULTIPLY THE TRANSPOSE OF A MATRIX BY A VECTOR

FMULT1 MULTIPLY A GIVEN NTH DEGREE POLYNOMIAL BY A GIVEN LINEAR FACTOR TO GIVE AN (N+1)TH DEGREE POLYNOMIAL

FMVCX MULTIPLY A COMPLEX MATRIX ON THE RIGHT BY A COMPLEX VECTOR

FMVX MATRIX-VECTOR MULTIPLICATION

FNORM1 NORMALIZE A VECTOR

FOURAP FIND THE LEAST SQUARES APPROXIMATING TRIGONOMETRIC POLYNOMIAL TO A SET OF GIVEN DATA HAVING EQUISPACED ABSCISSAE

FOURI	FIND AN INTERPOLATING TRIGONOMETRIC POLYNOMIAL TO A SET OF DATA HAVING EQUISPACED ABSCISSAE
FPUR	SUBTRACT FROM A VECTOR ITS COMPONENT ALONG ANOTHER VECTOR
GAMAIN	COMPUTE THE INCOMPLETE GAMMA FUNCTION
GAMMA	EVALUATE THE GAMMA FUNCTION OF A REAL ARGUMENT X
GITRFM	SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING M RIGHT-HAND SIDES WITH ITERATIVE REFINEMENT
GITRFS	SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING ONE RIGHT-HAND SODE WITH ITERATIVE REFINEMENT
GLESOM	SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING M RIGHT-HAND SIDES
GLESOS	SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING ONE RIGHT-HAND SIDE
GMI	EVALUATE NUMERICALLY A SINGLE, DOUBLE OR M-TUPLE (M.LE.10) INTEGRAL OF AN ARBITRARY INTEGRAND BETWEEN ARBITRARY LIMITS
HANKEL	EVALUATE THE COMPLEX-VALUED HANKEL FUNCTION OF THE FIRST OR SECOND KIND FOR REAL ARGUMENT AND INTEGER ORDER
HARM	COMPUTE A FINITE DISCRETE COMPLEX FOURIER TRANSFORM OF A ONE-, TWO- OR THREE-DIMENSIONAL ARRAY OF COMPLEX FOURIER AMPLITUDES
HCF	FIND THE HIGHEST COMMON FACTOR OF TWO INTEGERS
HELP	CALCULATE THE ROOTS OF A POLYNOMIAL HAVING COMPLEX COEFFICIENTS
HERMIT	EVALUATE THE INTEGRAL OF E**(-X**2)F(X)DX FROM NEGATIVE TO POSITIVE INFINITY WITH F(X) A REAL FUNCTION OF ONE VARIABLE
HRMT1	PERFORM INTERPOLATION, GIVEN A VALUE OF THE INDEPENDENT VARIABLE AND A TABLE OF CORRESPONDING VALUES OF THE INDEPENDENT AND DEPENDENT VARIABLE AND ITS DERIVATIVE - EXTRAPOLATION IS ALLOWED
HRMT2	PERFORM HERMITE INTERPOLATIONS, GIVEN AN ARRAY OF VALUES OF THE INDEPENDENT VARIABLE, AND A TABLE OF CORRESPONDING VALUES OF THE INDEPENDENT AND THE DEPENDENT VARIABLE AND ITS DERIVATIVE
HSSN	REDUCE A GENERAL REAL MATRIX TO AN UPPER HESSENBERG FORM BY A SIMILARITY TRANSFORMATION AND PROVIDE THE ELEMENTS IF THE TRANSFORMATION MATRIX
HSTGRM	DETERMINE THE NUMBER OF OBSERVATIONS OF A RANDOM VARIABLE WHICH LIE IN USER SPECIFIED INTERVALS - USED FOR DISTRIBUTION TESTS AND FOR PLOTTING HISTOGRAMS

INRPRD COMPUTE THE INNER PRODUCT OF TWO VECTORS

INT GIVEN THE REAL COEFFICIENTS OF A POLYNOMIAL, COMPUTE THE COEFFICIENTS OF THE INTEGRAL POLYNOMIAL

INVERS FIND THE INVERSE OF A SQUARE MATRIX USING DECOM AND FBSUBM

INVITR FIND THE INVERSE OF A SQUARE MATRIX WITH ITERATIVE REFINEMENT

IRAND GENERATE RANDOM INTEGERS BETWEEN TWO GIVEN VALUES - EACH OF THE INTEGERS BETWEEN THE GIVEN LIMITS HAS AN EQUAL PROBABILITY OF OCCURRING

ITERFM SOLVE LY=B AND LX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS WITH AN INTERATIVE REFINEMENT, WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS, AND L AND U ARE LOWER AND UPPER TRIANGULAR MATRICES OBTAINED FROM DECOM - PROVIDE THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION

ITERFS SOLVE LY=B AND LX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS WITH AN INTERATIVE REFINEMENT, WHERE B IS A COLUMN VECTOR, AND L AND U ARE LOWER AND UPPER TRIANGULAR MATRICES OBTAINED FROM DECOM - PROVIDE THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION

ITERIN PERFORM THE ITERATIVE REFINEMENT FOR THE INVERSE OF A SQUARE MATRIX

ITRLSQ PERFORM THE ITERATIVE REFINEMENT OF A LEAST SQUARES SOLUTION OBTANED FROM THE SUBROUTINE BSUBHT

ITRPDM SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS WITH AN ITERATIVE REFINEMENT FOR A POSITIVE DEFINITE SYSTEM AX=B (B IS A MATRIX CONSISTING OF M COLUMN VECTORS AND L AND U ARE THE LOWER TRIANGLE MATRIX AND ITS TRANSPOSE OBTAINED FROM CHSDEC) - PROVIDE THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION

ITRPDS SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS WITH AN ITERATIVE REFINEMENT FOR A POSITIVE DEFINITE SYSTEM AX=B (B IS A COLUMN VECTOR AND L AND U ARE THE LOWER TRIANGLE MATRIX AND ITS TRANSPOSE OBTAINED FROM CHSDEC) - PROVIDE THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION

ITRSPM SOLVE LY=B AND DLTX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS WITH ITERATIVE REFINEMENT (WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS, AND L AND LT ARE A LOWER TRIANGULAR MATRIX AND ITS TRANSPOSE, D IS A DIAGONAL MATRIX, OBTAINED FROM SPDCOM) - PROVIDE THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION

ITRSPS SOLVE LY=B AND DLTX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS WITH ITERATIVE REFINEMENT (WHERE B IS A COLUMN VECTOR, AND L AND LT ARE A LOWER TRIANGULAR MATRIX AND ITS TRANSPOSE, D IS A DIAGONAL MATRIX, OBTAINED FROM SPDCOM) - PROVIDE THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION

LAGDIF DIFFERENTIATE NUMERICALLY A TABULAR FUNCTION, AT ANY POINT

LAGINT PERFORM LAGRANGIAN INTERPOLATION AT A GIVEN ABSCISSA

LAGRAN EVALUATE THE INTEGRAL OF A REAL FUNCTION OF ONE VARIABLE, GIVEN THE ARRAYS OF THE INDEPENDENT AND THE DEPENDENT VARIABLES

LAGUER EVALUATE THE INTEGRAL OF F(X)DX FROM A TO E**-X WITH F(X) A REAL FUNCTION OF ONE VARIABLE AND E**-X THE WEIGHTING FN

LATNTR FIND THE EIGENVALUES (REAL AND COMPLEX) OF A REAL MATRIX

LCM FIND THE LEAST COMMON MULTIPLE OF TWO INTEGERS

LDIV DIVIDE A POLYNOMIAL WITH REAL COEFFICIENTS BY THE LINEAR EXPRESSION (X+B) - B IS REAL

LEGEND EVALUATE THE INTEGRAL OF A REAL FUNCTION OF ONE VARIABLE OVER A FINITE INTERVAL, WHEN THE FUNCTION GENERATOR IS GIVEN

LESWNE SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING ONE RIGHT-HAND SIDE WITH PARTIAL PIVOTING BUT WITHOUT ROW EQUILIBRATION - PROVIDE DATA FOR CALCULATING THE DETERMINANT

LESWNP SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING ONE RIGHT-HAND SIDE WITHOUT PIVOTING

LINBVP SOLVE NUMERICALLY LINEAR P-POINT BOUNDARY POINT PROBLEMS IN N FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS

LINSYS SOLVE GENERAL SYSTEMS OF LINEAR ALGEBRAIC EQUATIONS - PROVIDE THE DATA TO EVALUATE READILY THE DETERMINANT OF THE COEFFICIENT MATRIX

LITWNE SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING ONE RIGHT-HAND SIDE WITH ITERRATIVE REFINEMENT, WITH PARTIAL PIVOTING, WITHOUT ROW EQUILIBRATION - PROVIDE THE DATA FOR CALCULATING THE DETERMINANT AND THE DATA FOR ESTIMATING THE CONDITION NUMBER OF THE COEFFICIENT MATRIX

LITWNP	SOLVE A GENERAL SYSTEM OF LINEAR EQUATIONS HAVING ONE RIGHT-HAND SIDE WITH ITERATIVE REFINEMENT AND WITHOUT PIVOTING
LOGGAM	COMPUTE THE NATURAL LOGARITHM OF THE GAMMA FUNCTION FOR COMPLEX ARGUMENT
LSQHTM	SOLVE LINEAR LEAST SQUARES PROBLEMS FOR AN OVERDETERMINED SYSTEM WITH K RIGHT-HAND SIDES BY HOUSEHOLDER TRANSFORMATIONS
LSQHTS	SOLVE LINEAR LEAST SQUARES PROBLEMS FOR AN OVERDETERMINED SYSTEM WITH ONE RIGHT-HAND SIDE BY HOUSEHOLDER TRANSFORMATIONS
LSQSIT	SOLVE LINEAR LEAST SQUARES PROBLEMS BY HOUSEHOLDER TRANSFORMATION, USING ITERATIVE REFINEMENT
MIGEN	FIND A MINIMAX FUNCTION APPROXIMATION TO A SET OF POINTS IN TERMS OF A LINEAR COMBINATION OF A PRESCRIBED SET OF FUNCTIONS
MILN2	SMOOTH A SET OF DATA BY AN AVERAGING PROCESS
MINRAT	FIND A MINIMAX RATIONAL FUNCTION APPROXIMATION OF GIVEN DEGREE TO A SET OF POINTS
MPYR	FIND THE PRODUCT OF TWO POLYNOMIALS WHEN THE COEFFICIENTS ARE ALL REAL
MULLP	FIND ALL ZEROS OR A SINGLE ZERO OF A POLYNOMIAL HAVING COMPLEX COEFFICIENTS
NBESJ	COMPUTE BESSEL FUNCTIONS OF FIRST KIND FOR REAL ARGUMENT AND INTEGER ORDERS
NEWT	SOLVE A SYSTEM OF NON-LINEAR EQUATIONS
NONLIQ	SOLVE A SYSTEM OF NON-LINEAR ALGEBRAIC EQUATIONS
NRAND	GENERATE PSEUDO-RANDOM NUMBERS WHICH ARE NORMALLY DISTRIBUTED AND STORE VALUES IN A MULTIPLEXED ARRAY
NRICH	ENRICH A SET OF POINTS BY ADDING POINTS ON AN INTERPOLATING CURVE THROUGH THE GIVEN POINTS
NRKVS	SOLVE A SYSTEM OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS AT A POINT B WITH INITIAL VALUES GIVEN AT A POINT A
NRKVSH	SOLVE A SYSTEM OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS AT A POINT B WITH INITIAL VALUES GIVEN AT A POINT A
NRML	GENERATE PSEUDO-RANDOM NUMBERS HAVING A NORMAL DISTRIBUTION
NRMNO	GENERATE NORMALLY DISTRIBUTED PSEUDO-RANDOM NUMBERS WITH A CONVENIENT WAY OF HANDLING THE TAIL OF THE DISTRIBUTION - STORE THOSE NUMBERS IN A MULTIPLEXED DATA ARRAY

NRSG	SOLVE M BY N SYSTEM OF NON-LINEAR EQUATIONS
NSLVL	ESTIMATE THE ERROR PERFORMED IN THE EVALUATION OF A REAL POLYNOMIAL AT A COMPLEX POINT IN THE NEIGHBORHOOD OF ONE OF ITS ROOTS
OP1RAY	PERFORM ONE OF NINE POSSIBLE TRANSFORMATIONS ON THE OBSERVATIONS OF A SINGLE VARIABLE IN A MULTIPLEXED DATA ARRAY
OP2RAY	PERFORM AN ARITHMETIC OPERATION (+, -, *, /, **) ON THE CORRESPONDING OBSERVATIONS OF TWO VARIABLES STORED IN MULTIPLEXED DATA ARRAYS
ORTHFT	FIT A GIVEN SET OF POINTS WITH A LINEAR COMBINATION OF PRESCRIBED GENERAL FUNCTIONS OF LINEARLY INDEPENDENT VARIABLE(S)
ORTHON	GIVEN A SET OF N LINEARLY INDEPENDENT REAL VECTORS OF DIMENSION M, CONSTRUCT A SET WHICH SPANS THE SAME SUBSPACE AND WHOSE VECTORS ARE ORTHONORMAL WITH RESPECT TO A DEFINED INNER PRODUCT
PADE	APPROXIMATE FUNCTIONS WHICH HAVE MACLAURIN SERIES EXPANSIONS BY RATIONAL FUNCTIONS USING PADE APPROXIMATIONS
PARBL	EVALUATE THE INTEGRAL OF A BOUNDED REAL FUNCTION OF ONE REAL VARIABLE OVER A FINITE INTERVAL
PARFAC	RESOLVE A RATIONAL FUNCTION INTO PARTIAL FRACTIONS
PBETA	COMPUTE THE PROBABILITY OF OBTAINING A RANDOM VARIABLE HAVING A VALUE LESS THAN OR EQUAL TO X FVOM A BETA DISTRIBUTION
PBINOM	COMPUTE THE CUMULATIVE PROBABILITY FOR THE BINOMIAL DISTRIBUTION
PCHY	COMPUTE THE CUMULATIVE PROBABILITY FOR THE CAUCHY DISTRIBUTION
PDITRM	SOLVE A POSITIVE DEFINITE SYSTEM OF LINEAR EQUATIONS AX=B HAVING M RIGHT-HAND SIDES
PDITRS	SOLVE A POSITIVE DEFINITE SYSTEM OF LINEAR EQUATIONS AX=B HAVING ONE RIGHT-HAND SIDE
PDIV	PROVIDE THE QUOTIENT AND REMAINDER OBTAINED BY DIVIDING ONE POLYNOMIAL BY ANOTHER - COEFFICIENTS ARE REAL
PDLSOM	SOLVE A POSITIVE DEFINITE SYSTEM AX=B HAVING M RIGHT-HAND SIDES USING THE CHOLESKY DECOMPOSITION
PDLSOS	SOLVE A POSITIVE DEFINITE SYSTEM AX=B HAVING ONE RIGHT-HAND SIDE USING THE CHOLESKY DECOMPOSITION

PDSFBM SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS FOR A POSITIVE DEFINITE SYSTEM AX=B - B IS A MATRIX OF M COLUMN VECTORS AND L AND U ARE THE LOWER TRIANGULAR MATRIX AND ITS TRANSPOSE OBTAINED FROM CHSDEC

PDSFBS SOLVE LY=B AND UX=Y BY FORWARD AND BACKWARD SUBSTITUTIONS FOR A POSITIVE DEFINITE SYSTEM AX=B - B IS A COLUMN VECTOR AND L AND U ARE THE LOWER TRIANGULAR MATRIX AND ITS TRANSPOSE OBTAINED FROM CHSDEC

PFDIST COMPUTE THE PROBABILITY OF OBTAINING A RANDOM VARIABLE HAVING A VALUE LESS THAN OR EQUAL TO X FROM AN F- (VARIANCE-RATIO) DISTRIBUTION

PGEOM COMPUTE THE CUMULATIVE PROBABILITY FOR THE GEOMETRIC DISTRIBUTION

PGMMA COMPUTE THE PROBABILITY OF OBTAINING A RANDOM VARIABLE HAVING A VALUE LESS THAN OR EQUAL TO X FROM A GAMMA DISTRIBUTION

PHYPGE COMPUTE THE CUMULATIVE PROBABILITY FOR THE HYPERGEOMETRIC DISTRIBUTION

PIBETA DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A BETA DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIBIN DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A BINOMIAL DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PICHI DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A CHI-SQUARE DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PICHY DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A CAUCHY DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIEXP DETERMINE THE VALUE OF AN EXPONENTIALLY DISTRIBUTED RANDOM VARIABLE WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIFDIS DETERMINE THE VALUE OF A RANDOM VARIABLE FROM AN F DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIGAMA DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A GAMMA DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIGEO DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A GEOMETRIC DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIHYPG DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A HYPERGEOMETRIC DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PILGNM DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A LOG-NORMAL DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PINBIN DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A NEGATIVE BIMONIAL DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PINORM DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A NORMAL DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIPOIS DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A POISSON DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIRAYL DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A RAYLEIGH DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIT DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A STUDENT'S T DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PITRNM DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A TRUNCATED NORMAL DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIUNF DETERMINE THE VALUE OF A UNIFORMLY DISTRIBUTED, RANDOM VARIABLE WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIUNFD DETFRMINE THE VALUE OF A RANDOM VARIABLE FROM A UNIFORM DISCRETE DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PIWEBL DETERMINE THE VALUE OF A RANDOM VARIABLE FROM A WEIBULL DISTRIBUTION WHEN THE CUMULATIVE PROBABILITY IS GIVEN

PLAGR FORMS AND READS, AT A GIVEN STATION X, THE POLYNOMIAL PASSING THROUGH ALL OF A GIVEN SET OF POINTS

PLGNRM COMPUTE THE PROBABILITY OF OBTAINING A RANDOM VARIABLE HAVING A VALUE LESS THAN OR EQUAL TO X FROM A LOG-NORMAL DISTRIBUTION

PNBIN COMPUTE THE CUMULATIVE PROBABILITY FOR THE NEGATIVE BINOMIAL DISTRIBUTION

PNORM COMPUTE THE CUMULATIVE PROBABILITY FOR A NORMAL DISTRIBUTION

POIS COMPUTE THE CUMULATIVE PROBABILITY FOR THE POISSON DISTRIBUTION

PORAND GENERATE RANDOM INTEGERS HAVING THE POISSON DISTRIBUTION

PRAYL COMPUTE THE CUMULATIVF PROBABILITY FOR THE RAYLEIGH DISTRIBUTION

PRBEXP DETERMINE THE PROBABILITY OF OBTAIN NG A VARIABLE HAVING VALUE = XO FROM A POPULATION HAVING AN EXPONENTIAL DISTRIBUTION

PRBUNF DETERMINE THE PROBABILITY OF OBTAINING A VARIABLE HAVING VALUE = XO FROM A POPULATION HAVING A UNIFORM DISTRIBUTION

PRDSUM COMPUTE THE INNER PRODUCT OF TWO VECTORS AND ADD IT TO AN INCOMING VALUE C

PRICH ENRICH A GIVEN ARRAY WHICH DEFINES A CURVE BY INSERTING POINTS SO AS TO OPTIMIZE THE MERIT FUNCTION DEFINED IN CURV

PRONY CONSTRUCT AN APPROXIMATION WHICH IS THE SUM OF A PRESCRIBED NUMBER OF EXPONENTIALS TO A SET OF N DATA POINTS

PROOT FIND ALL REAL AND COMPLEX ROOTS OF A POLYNOMIAL WITH REAL COEFFICIENTS BY THE METHOD OF BAIRSTOW-NEWTON

PTDIST COMPUTE THE PROBABILITY OF OBTAINING A RANDOM VARIABLE HAVING A VALUE LESS THAN OR EQUAL TO X FROM A T- (STUDENT'S) DISTRIBUTION

PTRAN COORDINATE TRANSLATION SUCH THAT POLYNOMIAL P(X) BECOMES P(X+T) - P(X) HAS REAL COEFFICIENTS

PTRNRM COMPUTE THE PROBABILITY OF OBTAINING A RANDOM VARIABLE HAVING A VALUE LESS THAN OR EQUAL TO X FROM A TRUNCATED NORMAL DISTRIBUTION IN THE RANGE BETWEEN A AND B

PUNFD COMPUTE THE CUMULATIVE PROBABILITY FOR THE DISCRETE UNIFORM DISTRIBUTION

PWEBL COMPUTE THE PROBABILITY OF OBTAINING A RANDOM VARIABLE HAVING A VALUE LESS THAN OR EQUAL TO X FROM A WEIBULL DISTRIBUTION

QDIV DIVIDE A REAL POLYNOMIAL BY THE QUADRATIC EXPRESSION (X**2+B*X+C), B AND C REAL

QNWT SOLVE SYSTEMS OF NON-LINEAR ALGEBRAIC OF TRANSCENDENTAL EQUATIONS

QREIGN FIND ALL EIGENVALUES OF A COMPLEX MATRIX

QR1 PERFORM A SINGLE, COMPLEX QR-ITERATON ON A MATRIX IN UPPER HESSENBERG FORM, HAVING REAL SUBDIAGONAL ELEMENTS

QUAD PERFORM NUMERICAL QUADRATURE ON BOTH WELL-BEHAVED AND POORLY-BEHAVED FUNCTIONS

RAND GENERATE UNIFORMLY DISTRIBUTED OR NORMALLY DISTRIBUTED RANDOM NUMBERS

RATL COMPUTE THE COEFFICIENTS OF THE LEAST SQUARES APPROXIMATION TO A SET OF DISCRETE DATA BY A RATIONAL FUNCTION

RAYLGH COMPUTE THE RAYLEIGH QUOTIENT FOR REAL SYMMETRIC MATRICES

RBESY COMPUTE BESSEL FUNCTION OF SECOND KIND FOR POSITIVE REAL ARGUMENT AND INTEGER ORDERS

RECOV1 RECOVER EIGENVECTORS AFTER A REDUCTION USING A TRIANGULAR MATRIX IN THE SIMILARITY TRANSFORMATION

RECOV2 RECOVER EIGENVECTORS OF THE EIGENPROBLEMS BAY=LAMBDAY OR YTAB=LAMBDAYT, WHERE A, B ARE REAL, SYMMETRIC AND B IS POSITIVE DEFINITE

REDSY1 REDUCE THE EIGENPROBLEM (A-LAMBDAB)X=0 TO A STANDARD SYMMETRIC PROBLEM (P-LAMBDAI)Z=0 - A MUST BE REAL SYMMETRIC, B MUST BE REAL SYMMETRIC POSITIVE DEFINITE TO ALLOW THE DECOMPOSITION B=LLT

REDSY2 REDUCE TO STANDARD FORM THE EIGENPROBLEMS (AB-LAMBDAI)X=0 OR (BA-LAMBDAI)Y=0, WHERE A, B ARE REAL SYMMETRIC AND B IS POSITIVE DEFINITE

REV REVERSE THE ORDER OF REAL POLYNOMIAL COEFFICIENTS IN AN ARRAY

RICH ENRICH A GIVEN CURVE DEFINED BY AN ARRAY OF POINTS SO AS TO SATISFY A SPECIFIED CHORD HEIGHT TOLERANCE

RKINIT SOLVE A SYSTEM OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS AT A POINT B WITH INITIAL VALUES GIVEN AS A POINT A

ROMBG EVALUATE THE INTEGRAL OF A REAL FUNCTION OF ONE REAL VARIABLE OVER A FINITE INTERVAL USING ROMBERG INTEGRATION

RQNWT USES QNWT TO SOLVE SYSTEMS OF NONLINEAR, ALGEBRAIC OR TRANSCENDENTAL EQUATIONS (IT APPEARS TO BE USEFUL IN THAT IT DOES NOT GIVE UP ON DIFFICULT PROBLEMS AS EASILY AS OTHER MSL SUBROUTINES - QNWT SOLVED 34 OF 40 TEST CASES, RQNWT SOLVED ALL 40)

RUNSAB COUNT THE NUMBER OF RUNS ABOVE AND BELOW ZERO OF DIFFERENT LENGTHS AND THE EXPECTED NUMBER OF RUNS FOR A SAMPLE WHICH IS RANDOMLY SELECTED FROM A POPULATION SYMMETRICALLY DISTRIBUTED ABOUT ZERO

RUNSUD COUNT THE RUNS UP AND DOWN OF DIFFERENT LENGTHS IN A SAMPLE AND DETERMINE THE EXPECTED NUMBER OF RUNS OF DIFFERENT LENGTHS FOR A RANDOM SAMPLE

SBR SUBTRACT COEFFICIENTS OF LIKE POWERS OF TWO REAL POLYNOMIALS

SCONG SOLVE THE EQUATION SYSTEM AX-BAR=B-BAR BY THE CONJUGATE GRADIENT METHOD - DESIGNED TO BE USED WHEN THE MATRIX A IS LARGE BUT HAS MANY ZERO ELEMENTS

SEARCH USED IN THE TBLU PACKAGE TO PERFORM A BINARY TABLE SEARCH

SEPAR FIND ALL EIGENVALUES OF A REAL, SYMMETRIC TRIDIAGONAL MATRIX

SEPAR2 FIND A SUBSET OF EIGENVALUES OF A REAL, SYMMETRIC TRIDIAGONAL MATRIX

SHRINK COMPUTE THE COEFFICIENTS OF THE POLYNOMIAL P(AX) FROM THE COEFFICIENTS OF THE POLYNOMIAL P(X) - REAL COEFFICIENTS

SICI EVALUATE THE SINE AND COSINE INTEGRALS

SIGSMT PERFORM SMOOTHING OF A TRIGONOMETRIC SERIES BY USE OF LANCZOS SIGMA-FACTORS

SIMP TRANSFORM EIGENVECTORS OF AN UPPER HESSENBERG MATRIX H, WHERE H=(P**-1)AP, TO EIGENVECTORS OF THE SIMILAR MATRIX A

SIMPRC EVALUATE THE INTEGRAL OF ANY FUNCTION Y=F(X) BETWEEN THE LIMITS A AND B USING SIMPSON'S RULE

SINEVL EVALUATE A SINE POLYNOMIAL AT A GIVEN POINT

SINSER INTERPOLATE A SET OF N (ABSCISSA,ORDINATE)-PAIRS

SMOCUB PERFORM SMOOTHING

SMOOTH COMPUTE A VECTOR OF SMOOTHED FUNCTION VALUES GIVEN VECTORS OF ARGUMENT AND CORRESPONDING FUNCTION VALUES

SMTVX MULTIPLY THE TRANSPOSE OF A LARGE, SPARSE MATRIX BY A VECTOR

SMVX MATRIX-VECTOR MULTIPLICATION WHEN THE MATRIX IS LARGE AND SPARSE

SPDCOM DECOMPOSE A POSITIVE DEFINITE SYMMETRIC MATRIX WITHOUT USING THE SQUARE ROOT ROUTINE

SPDFBM SOLVE LY=B AND X=Y BY FORWARD AND BACKWARD SUBSTITUTIONS FOR A POSITIVE DEFINITE SYSTEM AX=B (B IS A MATRIX OF M COLUMN VECTORS, AND L AND U ARE THE LOWER TRIANGULAR MATRIX AND ITS TRANSPOSE, AND D THE DIAGONAL MATRIX OBTAINED FROM SPDCOM)

SPDFBS SOLVE LY=B AND X=Y BY FORWARD AND BACKWARD SUBSTITUTIONS FOR A POSITIVE DEFINITE SYSTEM AX=B (B IS A COLUMN VECTOR, AND L AND U ARE THE LOWER TRIANGULAR MATRIX AND ITS TRANSPOSE, AND D THE DIAGONAL MATRIX OBTAINED FROM SPDCOM)

SPDSOM SOLVE A POSITIVE DEFINITE SYSTEM AX=B HAVING M RIGHT-HAND SIDES WITHOUT USING THE SQUARE ROOT ROUTINE

SPDSOS SOLVE A POSITIVE DEFINITE SYSTEM AX=B HAVING ONE RIGHT-HAND SIDE WITHOUT USING THE SQUARE ROOT ROUTINE

SPITRM SOLVE A POSITIVE DEFINITE SYSTEM OF LINEAR EQUATIONS WITHOUT USING THE SQUARE ROOT ROUTINE WITH ITERATIVE REFINEMENT

SPITRS SOLVE A POSITIVE DEFINITE SYSTEM OF LINEAR EQUATIONS WITHOUT USING THE SQUARE ROOT ROUTINE WITH ITERATIVE REFINEMENT

SPLINE CONSTRUCT A 5TH DEGREE SPLINE INTERPOLATING A SET OF EQUISPACED DATA

START READ IN AND LIST INPUT DATA WHICH IS TO BE ENRICHED BY USING OTHER MSL ROUTINES

SUBDIA REDUCE A COMPLEX MATRIX TO UPPER HESSENBERG FORM BY SIMILARITY TRANSFORMATIONS, USING UNITARY MATRICES

SUBDIR REDUCE A REAL MATRIX TO UPPER HESSENBERG FORM

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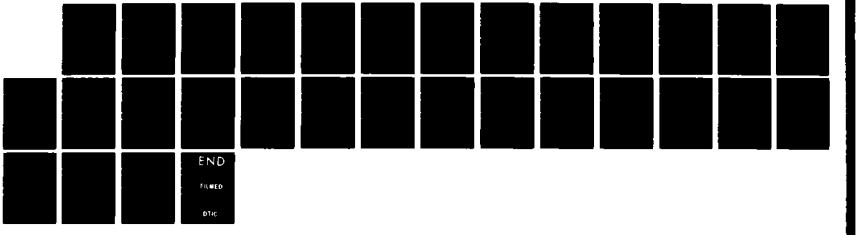

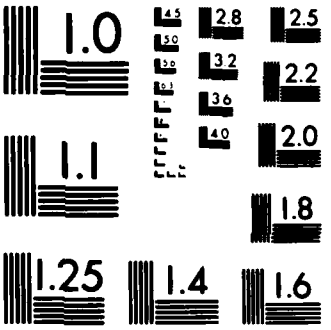

SUMPS	COMPUTE DOUBLE PRECISION SUMS OF THE POWERS OF OBSERVATIONS
SURFS	FIT A SMOOTH SURFACE WITH CONTINUOUS FIRST PARTIAL DERIVATIVES TO A SET OF POINTS DEFINED OVER A RECTANGULAR GRID
SYMLR	FIND ALL EIGENVALUES OF A REAL, SYMMETRIC TRIDIAGONAL MATRIX
SYMQR	FIND ALL EIGENVALUES OF A REAL, SYMMETRIC TRIDIAGONAL MATRIX
TBLU1	TABLE SEARCH AND INTERPOLATION WITH ONE INDEPENDENT VARIABLE
TBLU2	TABLE SEARCH AND INTERPOLATION WITH TWO INDEPENDENT VARIABLES
TBLU3	TABLE SEARCH AND INTERPOLATION WITH THREE INDEPENDENT VARIABLES
TCDIAG	COMPUTE PARTIAL OR COMPLETE EIGENSYSTEMS OF HERMETIAN MATRICES
TERP1	POLYNOMIAL INTERPOLATION FOR ONE INDEPENDENT VARIABLE
TERP2	POLYNOMIAL INTERPOLATION FOR TWO INDEPENDENT VARIABLES
TERP3	POLYNOMIAL INTERPOLATION FOR THREE INDEPENDENT VARIABLES
TRDCNP	PERFORM TRIANGULAR DECOMPOSITION OF A TRIDIAGONAL MATRIX WITHOUT PIVOTING
TRDCOM	PERFORM TRIANGULAR DECOMPOSITION OF A TRIDIAGONAL MATRIX WITH PARTIAL PIVOTING
TRDFBM	PERFORM BACK SUBSTITUTION
TRDSOM	SOLVE A TRIDIAGONAL SYSTEM OF EQUATIONS USING TRIANGULAR DECOMPOSITION WITH PARTIAL PIVOTING AND BACK SUBSTITUTION
TRDSUB	PERFORM BACK SUBSTITUTION
TRDWNP	SOLVE A TRIDIAGONAL SYSTEM OF EQUATIONS USING TRIANGULAR DECOMPOSITION WITHOUT PIVOTING AND BACK SUBSTITUTION
TRGDIF	DIFFERENTIATE FORMALLY A TRIGONOMETRIC POLYNOMIAL
TRGINT	INTEGRATE FORMALLY A TRIGONOMETRIC POLYNOMIAL
TRIDI	REDUCE A REAL, SYMMETRIC MATRIX TO TRIDIAGONAL FORM BY USE OF HOUSEHOLDER'S REDUCTION
TRILOM	SOLVE A LOWER TRIANGULAR SYSTEM LX=B WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS
TRILOS	SOLVE A LOWER TRIANGULAR SYSTEM LX=B WHERE B IS A SINGLE COLUMN VECTOR
TRIUPM	SOLVE AN UPPER TRIANGULAR SYSTEM UX=B WHERE B IS A MATRIX CONSISTING OF M COLUMN VECTORS

TRIUPS SOLVE AN UPPER TRIANGULAR SYSTEM UX=B WHERE B IS A SINGLE COLUMN VECTOR

TRLOIN INVERT A LOWER TRIANGULAR MATRIX

TRUPIN INVERT AN UPPER TRIANGULAR MATRIX

UNCSPL CONSTRUCT A NONLINEAR CUBIC SPLINE WITH CONTINUOUS SECOND DERIVATIVE THROUGH A GIVEN SET OF DATA

URAND GENERATE UNIFORMLY DISTRIBUTED PSEUDO-RANDOM NUMBERS WITH THE SPECIFIED UPPER AND LOWER LIMITS AND STORE VALUES AS ONE VARIABLE IN A MULTIPLEXED DATA ARRAY

VALVEC FIND ALL (OR A SUBSET OF) EIGENVECTORS OF A COMPLEX MATRIX

VARORD ARRANGE THE OBSERVATIONS OF ONE OF THE VARIABLES IN A MULTIPLEXED DATA ARRAY SO THAT THESE OBSERVATIONS ARE STORED IN INCREASING ORDER

VECORD ORDER A SET OF COMPLEX NUMBERS ACCORDING TO MAGNITUDE, EITHER INCREASING OR DECREASING

VECTOR GIVEN A GOOD APPROXIMATION TO AN EIGENVALUE OF A REAL, SYMMETRIC TRIDIAGONAL MATRIX, FIND THE CORRESPONDING EIGENVECTOR AND TRANSFORM THE RESULT ACCORDING TO STORED INFORMATION ABOUT THE ORIGINAL, FULL MATRIX

VIP COMPUTE THE INNER PRODUCT OF TWO VECTORS

VIPA COMPUTE THE INNER PRODUCT OF TWO VECTORS AND ADD IT TO AN INCOMING VALUE C

VIPD COMPUTE THE INNER PRODUCT OF TWO VECTORS WITH DOUBLE PRECISION ACCUMULATION

VIPDA COMPUTE THE INNER PRODUCT OF TWO VECTORS WITH DOUBLE PRECISION ACCUMULATION AND ADD IT TO AN INCOMING VALUE C

VIPDS COMPUTE THE INNER PRODUCT OF TWO VECTORS WITH DOUBLE PRECISION ACCUMULATION AND SUBTRACT IT FROM AN INCOMING VALUE C

XIRAND GENERATE RANDOM FLOATING POINT NUMBERS BETWEEN TWO GIVEN VALUES - EACH OF THE FLOATING POINT NUMBERS BETWEEN THE GIVEN LIMITS HAS AN EQUAL PROBABILITY OF OCCURRING

XPLOT PRINTER PLOT OF UP TO 5 VARIABLES OR SETS OF DATA (ORDINATE) IN THE ORDER IN WHICH THE VALUES ARE STORED (ABSCISSA)

XYPLOT PRINTER PLOT OF UP TO 5 ORDINATE VARIABLES VERSUS A SINGLE ABSCISSA VARIABLE WHERE THE NUMBER OF VALUES FOR THE ABSCISSA IS THE SAME AS THE NUMBER OF VALUES FOR EACH OF THE ORDINATE VARIABLES

ZAFUJ FIND N ZEROS OF AN ARBITRARY COMPLEX-VALUED FUNCTION OF A COMPLEX VARIABLE

ZAFUM FIND N ZEROS OF AN ARBITRARY COMPLEX-VALUED FUNCTION OF A COMPLEX VARIABLE

ZAFUR FIND N ZEROS OF AN ARBITRARY REAL-VALUED FUNCTION OF A REAL VARIABLE

ZCOUNT COUNT THE NUMBER OF TIMES A FUNCTION F(Z) CIRCLES THE ORIGIN AS Z TRANSVERSES ANY CONTOUR MADE UP OF STRAIGHT LINE SEGMENTS IN A COMPLEX PLANE, AND HENCE THE NUMBER OF ZEROS OF F(Z) WITHIN CLOSED CONTOURS (IF THERE ARE POLES WITHIN THE CONTOUR THEN THE PHRASE "NUMBER OF ZEROS" SHOULD BE REPLACED BY "NUMBER OF ZEROS - NUMBER OF POLES")

ZRNM COMPUTE THE MEAN VALUE OF A SET OF OBSERVATIONS AND SUBTRACTS THE MEAN FROM EACH OF THE OBSERVATIONS

*** NSRDC ***

'NSRDC' IS A LIBRARY OF DTNSRDC WRITTEN AND/OR SUPPORTED SCIENTIFIC AND UTILITY SUBPROGRAMS.

REFERENCES: MOST OF THESE ROUTINES ARE DOCUMENTED IN CLIB/N, WHICH MAY BE OBTAINED FROM USER SERVICES. OTHER EXISTING DOCUMENTS ARE ON FILE IN USER SERVICES.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'NSRDC' INCLUDE:

AC	GET ACCOUNT NUMBER FOR THIS JOB
ACP	ADD CROSS PRODUCT VARIABLES - STATISTICS
ADJL	LEFT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS
ADJR	RIGHT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS
AI	AIRY FUNCTION INTEGRAL
ALTIME	OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE START OF JOB (OR INTERCOM SESSION)
AMAXE	FIND MAXIMUM VALUE OF AN ARRAY (ALSO CONTAINS MAXE)
AMINE	FIND MINIMUM VALUE OF AN ARRAY (ALSO CONTAINS MINE)
ANOVA1	ONE-WAY ANALYSIS OF VARIANCE WITH UNEQUAL N
ANOVA2	TWO-WAY ANALYSIS OF VARIANCE WITH EQUAL N
AOV	ANALYSIS OF VARIANCE FROM EQUAL NUMBER OF EQUAL WEIGHT DESIGNS - TOTALS, DEVIATES, SUMS OF SQUARES, DEGREES OF FREEDOM, MEAN SQUARES
APOWR	EXPONENTIATION OF POWER SERIES - ONE VARIABLE
ASA	AUTOCORRELATION AND SPECTRAL ANALYSIS FROM STATIONARY TIME SERIES, GIVES POWER SPECTRUM, LAGGED SUMMS AND PRODUCTS
ASCADD	ADD AN ASCII STRING TO ANOTHER ASCII STRING
ASCADM	ADD AN ASCII STRING TO ANOTHER ASCII STRING MULTIPLE TIMES
ASCBSX	REMOVE BS (BACKSPACE) AND CAN (CTRL-X) FROM A STRING
ASCGET	GET AN ASCII CHARACTER FROM AN ASCII STRING
ASCII	CREATE AN ASCII MESSAGE FROM STRINGS OF ASCII CHARACTERS

ASCIII	INITIALIZE COMMON BLOCK /ASCII/ WITH ASCII CHARACTERS
ASCLEN	FIND LENGTH OF AN ASCII STRING
ASCPUT	ADD AN ASCII CHARACTER TO AN ASCII STRING
ASCTXT	CONVERT A DISPLAY CODE STRING TO AN ASCII STRING AND PUT IT INTO AN ASCII BUFFER
ASHIFT	SHIFT EACH WORD OF AN ARRAY
ASORT	FTN ALPHANUMERIC SORT
ASORTMV	SORT 2-DIMENSIONAL ARRAY USING A FAST ARRAY MOVING SUBROUTINE
BANR	PRINT A BANNER (LETTERS ARE 10 LINES HIGH, LINES ARE 110 CHARACTERS LONG)
BANR6	PRINT A BANNER (LETTERS ARE 6 LINES HIGH, LINES ARE 80 CHARACTERS LONG)
BDS	BASIC DESCRIPTIVE STATISTICS - MEAN, SECOND, THIRD, FOURTH MOMENTS, VARIANCE, STANDARD DEVIATION, SKEWNESS, KURTOSIS
BEJY0	ZERO-ORDER BESSEL FUNCTIONS FOR REAL ARGUMENTS
BEJY1	FIRST ORDER BESSEL FUNCTIONS FOR REAL ARGUMENTS
BESSI	MODIFIED BESSEL FUNCTION OF THE FIRST KIND
BESSJ	BESSEL FUNCTION OF THE FIRST KIND
BESSK	MODIFIED BESSEL FUNCTION OF THE SECOND KIND
BESSY	BESSEL FUNCTION OF THE SECOND KIND
BMAM	SOLVE SYSTEM AX=B FOR BANDED SYMMETRIC MATRICES
BPOWR	EXPONENTIATION OF POWER SERIES IN TWO VARIABLES
BSJ	SPHERICAL BESSEL FUNCTION
CBSF	COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
CEI3	COMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND
CELLI	COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND SECOND KIND
CENTER	CENTER A CHARACTER STRING WITHIN AN OUTPUT FIELD

CGAUSS	COMPLEX SOLUTION OF SIMULTANEOUS EQUATIONS AND DETERMINANT BY ITERATIVE GAUSSIAN ELIMINTAION
CHFILL	FILL (PORTION OF) AN ARRAY WITH A CHARACTER
CHNGSEQ	ALLOW COBOL4 USER TO DEFINE A COLLATING SEQUENCE
CMPINV	COMPLEX MATRIX INVERSION
CMR	CORRELATION MATRIX WITH OPTIONAL MEAN AND STANDARD DEVIATION
COMBES	BESSEL FUNCTIONS FOR COMPLEX ARGUMENT AND ORDER
COMPSTR	COMPARE TWO CHARACTER STRINGS
CONTRCT	SQUEEZE ARRAY OF 1R-FORMAT CHARACTERS TO LEFT (SEE EXPAND)
COTAN	COTANGENT FUNCTION
COUPLE	LOGICALLY CONNECT TWO WORDS
CRDTAB	READ TABLES FOR FRMRAN AND FRMRA2 INTERPOLATION
DATCNV	CONVERT DATE FORMATS (USES INTEGERS)
DATFMT	CONVERT DATE FORMATS (USES CHARACTER STRINGS)
DAYONOF	PACKAGE OF SIX SUBROUTINES TO MANIPULATE THE DAYFILE SETTING SETTINGS
DISCOT	SINGLE OR DOUBLE INTERPOLATION
DMPA	CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION) (NO HEADINGS ARE PROVIDED)
DMPCPA	DUMP JOB CONTROL POINT AREA
DOV	DELETION OF VARAIBLES - STATISTICS
DPROOT	FIND ALL ROOTS OF A REAL DOUBLE PRECISION POLYNOMIAL
DUMPA	GIVE OCTAL AND CHARACTER DUMP OF USER-SPECIFIED AREA
DUMPCPA	EXPANDED DUMP OF JOB CONTROL POINT AREA
DUMPFL	CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION)
D630I	INITIALIZE COMMON BLOCK /D630/ WITH ASCII CONTROL CODES FOR DIABLO 630 TERMINALS

ELLI	ELLIPTIC INTEGRAL
ELLIP	ELLIPTIC INTEGRAL
ELTIME	OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL TO ELTIME
EQU60	LOGICAL COMPARE OF TWO ARRAYS
ERROR	ERROR FUNCTION
EXPAND	EXPAND CHARACTER STRING INTO ARRAY OF 1R-FORMAT WORDS (SEE CONTRCT)
EXPINT	EXPONENTIAL INTEGRAL
EXPRM	EXTRACT NEXT PARAMETER FROM EXECUTE CARD
EXTBIT	EXTRACT BITS FROM A WORD
EXTPRM	EXTRACT NEXT PARAMETER FROM USER-SUPPLIED PARAMETER STRING
FASTIN	READ AND UNPACK DATA PREPARED ON THE XDS-910 A/D CONVERSION SYSTEM
FBINRD	UNPACK AN INPUT ARRAY (N BITS PER INPUT CHARACTER INTO CDC WORD)
FFT	FAST FOURIER TRANSFORM FOR COMPLEX TABULATED FUNCTION
FFT5	FAST FOURIER TRANSFORM
FGI	FORTRAN GAUSSIAN INTEGRATION
FINDC	FIND PRESENCE OR ABSENCE OF SPECIFIED CHARACTER IN AN ARRAY (USER SPECIFIES RELATIONAL OPERAND)
FINDW	FIND PRESENCE OR ABSENCE OF SPECIFIED WORD IN AN ARRAY (USER SPECIFIES RELATIONAL OPERAND)
FINDWRD	FIND SPECIFIED WORD IN AN ARRAY
FNOL3	INTEGRATE SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS
FRESNEL	EVALUATE FRESNEL INTEGRALS
FRMRAN	LINEAR TABLE INTERPOLATION (ONE OR TWO INDEPENDENT VARIABLES)
FRMRA2	LINEAR TABLE INTERPOLATION (MULTIPLE INDEPENDENT VARIABLES)
FTNRFL	GET/SET CORE SIZE

GAMCAR	COMPLEX GAMMA FUNCTION OF A COMPLEX ARGUMENT HAVING POSITIVE REAL PART
GAMMA	INCOMPLETE OR COMPLETE GAMMA FUNCTION
GAUSS	SIMULTANEOUS EQUATION SOLUTION WITH DETERMINANT BY ITERATIVE GAUSSIAN ELIMINATION
GETCCL	GET CCL FIELDS (REGISTERS AND FLAGS)
GETCHA	EXTRACT CHARACTER FROM SPECIFIED POSITION IN AN ARRAY
GETCHR	EXTRACT CHARACTER FROM SPECIFIED POSITION IN A WORD
GETDABA	GET DYNAMIC AREA BASE ADDRESS AND DETERMINE IF CMM IS ACTIVE
GETFIT	GET SPECIFIED FIT ADDRESS
GETHQUR	FOR A SPECIFIED PERIOD OF TIME (UP TO 2 HR 59 MIN 59 SEC) DETERMINE WHICH HOUR IS OCCUPIED THE LONGEST
GETLFNS	GET ACTUAL LOCAL FILE NAMES (FOR FTN)
GETLGO	EXTRACT FIRST 10 CHARACTERS OF ALL EXECUTE CARD PARAMETERS
GETRA	GET PROGRAM COMMUNICATION REGION (RA+0 THRU RA+77B)
GMHAS	HARMONIC ANALYSIS
GODROP	ISSUE USER-SPECIFIED GO/DROP MESSAGE
HELP	COMPLEX ZEROES OF REAL OR COMPLEX POLYNOMIAL
HERE	GET TERMINAL ID FOR THIS JOB
HEX3	SQUEEZE 3-CHARACTER HEX INTO 12 BITS
HIFAC	HIGHEST COMMON FACTOR OF TWO POLYNOMIALS
IAOC	COUNT ONE-BITS IN SPECIFIED WORD
IBL	CALCULATE BEST BLOCK LENGTH (MIN TIME REQ'D FOR RANDOM ACCESS AND MINIMUM BUFFER SIZE) FOR INDEX SEQUENTIAL FILES
IBUNP	UNPACK 12-BIT BYTES FROM ARRAY
IDAYWEK	FUNCTION TO DETERMINE THE DAY OF THE WEEK FOR ANY DATE FROM 10/15/1582 THRU 02/28/4000
IDID	GET USER INITIALS (AND INTERCOM USER ID) FROM CHARGE CARD OR LOGIN
IDIGIT	CHECK FOR DIGITS IN A FIELD WITHIN A WORD

IFINDCH	FIND FIRST OCCURRENCE OF SPECIFIED CHARACTER IN ARRAY
IFMTV	FAST I-FORMAT DECODE OF VARIABLE LENGTH INPUT
IHMS	CONVERT SECONDS TO ' HH.MM.SS.' (SEE ISEC)
IPAKLFT	SQUEEZE LEFT AND REMOVE ZEROS (00B) AND BLANKS (55B), RETURN NUMBER OF CHARACTERS
IROMAN	CONVERT ROMAN NUMBERS TO INTEGER
ISEC	CONVERT HH.MM.SS TO SECONDS (SEE IHMS)
ISITCNF	TEST FOR CONNECTED FILE
ISSORT	FTN-CALLABLE SHELL SORT FOR INTEGER ARRAYS
ISTAPE	GENERATE TAPE NAME 'TAPENN'
ISUMIT	SUM ELEMENTS OF INTEGER ARRAY
JGDATE	CONVERT ANY GREGORIAN DATE TO A JULIAN DATE AND VICE VERSA (MULTI-YEAR)
JOBCM	GET JOB CARD CM
JOBNAME	GET NOS/BE JOB NAME FOR THIS JOB
JOBORG	GET JOB ORIGIN (BATCH, INTERCOM, GRAPHICS, MULTI-USER)
JULIAN	CONVERT ANY GREGORIAN DATE TO A JULIAN DATE AND VICE VERSA (SINGLE YEAR)
KUTMER	INTEGRATE A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS USING THE KUTTA-MERSON FOURTH-ORDER, SINGLE-STEP METHOD
LASTCH	FIND LAST NON-BLANK CHARACTER IN ARRAY
LASTWRD	FIND SUBSCRIPT OF LAST WORD OF ARRAY WHICH CONTAINS A NON-BLANK
LBYT	EXTRACT VARIABLE LENGTH BYTE
LEFTADJ	SQUEEZE LEFT AND REMOVE BLANKS AND 00B (USER MAY SUPPLY TRAILING FILL CHARACTER)
LFPFERR	DECODE THE "ERR" CODE FROM FILE MANIPULATION SUBROUTINES PF AND LF
LIBBAM	DUMMY SUBROUTINE TO FORCE LDSET,LIB=BAMLIB
LIBSYM	DUMMY SUBROUTINE TO FORCE LDSET,LIB=SYMLIB
LINE6	SET PRINT FILE TO 6 LINES PER INCH
LINE8	SET PRINT FILE TO 8 LINES PER INCH

LOGGAM	LOGARITHM OF GAMMA FUNCTION FOR COMPLEX ARGUMENT
LSQSUB	GENERAL WEIGHTED LEAST SQUARES FIT
MACHINE	READ 4-WORD SYSTEM HEADING
MAM	SOLVE SYMMETRIC SYSTEM OF LINEAR EQUATIONS
MAM200	SOLVE 200 SYMMETRIC LINEAR EQUATIONS
MASKIT	DYNAMIC MASK GENERATOR
MATINS	MATRIX INVERSE WITH SIMULTANEOUS EQUATION SOLUTION AND DETERMINANT
MATRIX	MATRIX ALGEBRA - TRANSPOSE, MOVE, SYMMETRIC PRODUCT, EIGENVALUE/EIGENVECTOR, PACK SYMMETRIC, UNPACK SYMMETRIC, INVERSE, SOLUTION OF LINEAR EQUATIONS, MULTIPLY, ADD, SUBTRACT, TRANSPOSE MULTIPLY.
MAXE	FIND MAXIMUM VALUE OF AN ARRAY (ALSO CONTAINS AMAXE)
MEMUSED	PRINT MESSAGE IN DAYFILE GIVING FIELD LENGTH IN USE AT TIME OF CALL TO THIS ROUTINE
MFETCH	FETCH A SINGLE WORD FROM USER'S FL (SEE MSET)
MFRAME	OBTAIN THE MACHINE AND MAINFRAME RUNNING THE PROGRAM
MF2CPU	RETURN CPU NAME CORRESPONDING TO SUPPLIED MAINFRAME NAME
MINE	FIND MINIMUM VALUE OF AN ARRAY (ALSO CONTAINS AMINE)
MINMAX	GENERALIZED NONLINEAR ITERATOR
MONTH	FROM A DATE (MM/DD/YY) FIND THE MONTH AND RETURN FULL SPELLING AND 3- OR 4-CHARACTER ABBREVIATION
MOVCHAR	MOVE ONE CHARACTER FROM ONE STRING TO ANOTHER
MOVECM	MOVE WORDS FROM ONE AREA IN CORE TO ANOTHER
MOVEIT	MOVE AN ARRAY (MOVLEV REPLACEMENT WHICH CALLS MOVECM)
MOVSTR	MOVE A STRING OF CHARACTERS FROM ONE ARRAY TO ANOTHER
MRA	MULTIPLE REGRESSION ANALYSIS - LEAST SQUARES ESTIMATE OF LINEAR RELATIONSHIPS
MSET	SET A SINGLE WORD IN USER'S FL (SEE MFETCH)
MXGET	EXTRACT (RIGHT-JUSTIFIED, ZERO-FILLED) 0-10 6-BIT CHARACTERS FROM 60-BIT WORDS

NEWDAT	ADD/SUBTRACT SPECIFIED NUMBER OF DAYS TO/FROM A GIVEN DATE
NFILL	FILL ELEMENTS 1 THRU N OF AN ARRAY WITH THE VALUES 1 THRU N, RESPECTIVELY
NFILLT	TEST AN ARRAY FOR THE PRESENCE OF THE INTEGERS 1 THRU N IN ELEMENTS 1 THRU N, RESPECTIVELY
NROOTS	REAL AND COMPLEX ROOTS OF REAL POLYNOMIAL
NUMEXEC	GET NUMBER OF EXECUTE CARD PARAMETERS WHICH WERE USED IN THIS EXECUTION OF THE PROGRAM
NUMVAR	DETERMINE NUMBER OF ARGUMENTS IN CALL TO SUBPROGRAM
OFMTDE	FAST O-FORMAT DECODE
OFMTV	FAST O-FORMAT DECODE OF VARIABLE LENGTH INPUT
OMRONI	INITIALIZE COMMON BLOCK /OMRON/ WITH ASCII CONTROL CODES FOR OMRON CRT'S
OPLSA	ORTHOGONAL POLYNOMIAL LEAST SQUARE APPROXIMATION
OVLNAME	GET NAME OF FILE CURRENTLY BEING EXECUTED
PARGET	GET ALL PARAMETERS OF USER-SUPPLIED PARAMETER STRING
PCA	PRINCIPLE COMPONENT ANALYSIS - EIGENVALUES AND EIGENVECTORS OF CORRELATION MATRIX, TRANSFORMS NORMALIZED OBSERVATION INTO ORTHOGONAL COMPONENTS AND CHECKS ACCURACY
PF	FORTRAN CALLABLE PERMANENT FILE FUNCTIONS AND AUXILIARY FILE ACTION REQUESTS
PFRC	SUPPLY DESCRIPTION OF PERMANENT FILE FUNCTION RETURN CODE
PLOTMY	PRINTER PLOT - MULTIPLE CURVES
PLOTPR	PRINTER PLOT - MULTIPLE CURVES
PLOTXY	PRINTER PLOT - SINGLE CURVE
POLDIV	POLYNOMIAL DIVISION
POLYN	LEAST SQUARES POLYNOMIAL FIT
POWR1	1 TERM IN EXPONENTIATION OF POWER SERIES - ONE VARIABLE
POWR2	1 TERM IN EXPONENTIATION OF POWER SERIES - TWO VARIABLES
PROD2	1 TERM IN PRODUCT OF POWER SERIES - TWO VARIABLES
PROOT	FIND ALL ROOTS OF A REAL PLOYNOMIAL

PRTFL	PRINT CURRENT FL (OR PUT INTO DAYFILE)
PRTIME	GET AND PRINT CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL AND PRINT USER-SUPPLIED MESSAGE
PSI	COMPLEX PSI FUNCTION
PUTCHA	INSERT CHARACTER INTO SPECIFIED POSITION IN AN ARRAY
PUTCHR	INSERT CHARACTER INTO SPECIFIED POSITION IN A WORD
QSORT	IN-CORE ASCENDING SORT FOR ARRAYS LARGER THAN 500 WORDS
QSORT1	IN-CORE ASCENDING SORT WITH RE-ORDERING OF ASSOCIATED ARRAY (FOR ARRAYS LARGER THAN 500 WORDS)
QUADG	INTEGRAL BY GAUSS-LEGENDRE 10-POINT QUADRATURE
QUART	REAL OR COMPLEX ROOTS OF QUARTIC
RANNUM	NORMALLY DISTRIBUTED RANDOM NUMBERS
RCPA	READ (A PORTION OF) CONTROL POINT AREA
RECOVRD	ON RECOVERY, PRINT EXCHANGE JUMP PACKAGE, RA+0 THRU RA+77B
REDUCE	REDUCE FL TO MINIMUM -OR- REQUEST ADDITIONAL FL RELATIVE TO START OF BLANK COMMON
REPLAC	REPLACE ONE CHARACTER WITH ANOTHER IN AN ARRAY
REPLACM	REPLACE SEVERAL CHARACTERS WITH OTHER CHARACTERS
REPLHI	REPLACE ALL CHARACTERS GREATER THAN SPECIFIED CHARACTER WITH NEW CHARACTER
REPLLO	REPLACE ALL CHARACTERS LESS THAN SPECIFIED CHARACTER WITH NEW CHARACTER
REPLNE	REPLACE ALL CHARACTERS (EXCEPT SPECIFIED CHARACTER) WITH A SPECIFIED CHARACTER
RFFT	FAST FOURIER TRANSFORM FOR REAL TABULATED DATA
RFSN	REVERSE FAST FOURIER TRANSFORM
RNDMIZ	EMULATE BASIC LANGUAGE 'RANDOMIZE' STATEMENT (CAN BE USED TO GUARANTEE FIRST CALL TO RANF WILL RESULT IN A DIFFERENT NUMBER WITH EACH EXECUTION OF A PROGRAM)
RN1	UNIFORM RANDOM NUMBER USING TWO CONGRUENTIAL GENERATORS
RN2	UNIFORM RANDOM NUMBER USING ONE CONGRUENTIAL GENERATOR

ROOTER	GENERAL ROOT FINDER
ROUTERC	SUPPLY DESCRIPTION OF ROUTE RETURN CODE
RSO	RANK ORDER STANDARDIZED OBSERVATIONS
SBYT	STORE VARIABLE LENGTH BYTE
SEMICO	REPLACE DISPLAY CODE 00B WITH 77B (SEMI-COLON)
SETREW	CONVERT ALPHABETIC REWIND OPTION INTO RM OPEN AND CLOSE CODES
SHIFTA	SHIFT ARRAY A SPECIFIED NUMBER OF BITS (CROSSING OVER WORD BOUNDARIES)
SIMP	SIMPSON'S RULE INTEGRATION
SIMPUN	SIMPSON'S RULE INTEGRATION - UNEQUAL INTERVALS
SKPFIL	REPOSITION A SEQUENTIAL FILE FORWARD OR BACKWARD BY A SPECIFIED NUMBER OF UNITS (FOR EXISTING RECORDS ONLY)
SKPSTAT	GET THE STATUS OF THE LAST CALL TO 'SKPFIL'
SKWEZL	SQUEEZE LEFT AND REMOVE BLANKS AND 00B
SKWEZR	SQUEEZE RIGHT AND REMOVE BLANKS AND 00B
SMOOTH	LEAST SQUARES POLYNOMIAL SMOOTHING
SNCNDN	JACOBIAN ELLIPTIC FUNCTION
SOV	STANDARDIZATION OF VARIABLES - STATISTICS
SPLFIT	SPLINE CURVE FIT
SQFIT	POLYNOMIAL LEAST SQUARE FIT
SR1	INITIAL STEPWISE REGRESSION ANALYSIS BASED ON BMD02R
SR2	ONE STEP IN STEPWIDE REGRESSION ANALYSIS
SR3	COMPUTE RESIDUALS FROM SR2 REGRESSION
SSORT	FTN SHELL SORT
SSORTF	FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS
SSORTI	FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS
SSORTL	FTN LOGICAL SHELL SORT
SSORT3	FTN-CALLABLE SHELL SORT FOR REAL ARRAYS WITH ASSOCIATED REAL ARRAY AND INTEGER ARRAY

STUTEE	STUDENT'S T DISTRIBUTION
SUMIT	SUM ELEMENTS OF REAL ARRAY
SWAP	SWAP TWO ARRAYS
TEKTRI	INITIALIZE COMMON BLOCK /TEKTRN/ WITH ASCII CONTROL CODES FOR THE TEKTRONIX GRAPHICS TERMINALS
TIMLEFT	DETERMINE CP (AND IO) TIME LEFT SINCE START OF BATCH JOB OR INTERCOM COMMAND
TOV	TRANSFORMATION OF VARIABLES BY IDENTITY, LOG BASE 10, SQUARE ROOT, SQUARE
TRAILBZ	CHANGE TRAILING BLANKS TO ZEROS (00B)
UNHEX3	SPREAD 2 CHARACTERS INTO 3 HEX DIGITS
UNLOAD	UNLOAD A FORTRAN FILE
VALDAT	LOGICAL FUNCTION TO VALIDATE A DATE FORMAT
VALIDT	VALIDATE AN ARRAY TO SEE THAT EACH ELEMENT IS ONE OF A USER-SPECIFIED LIST
VARAH1	EIGENVALUES AND EIGENVECTORS OF A GENERAL REAL MATRIX
VARAH2	IMPROVED ESTIMATES AND BOUNDS FOR EIGENSYSTEM OF A GENERAL REAL MATRIX
VFILL	FILL AN ARRAY WITH USER-SPECIFIED WORD
VT100I	INITIALIZE COMMON BLOCK /VT100/ WITH ASCII CONTROL CODES FOR THE DEC VT100 CRT
WARNING	FTN-CALLABLE 'WARNING' CONTROL CARD
WEKDAY	DETERMINE THE DAY OF THE WEEK FOR ANY GREGORIAN DATE FROM OCTOBER 15, 1582 THRU FEBRUARY 28, 4000
XFIL	FILON'S METHOD FOR INTEGRALS WITH SIN AND COS
ZBLANK	CHANGE BLANKS TO 00B AND VICE VERSA
ZEROFL	ZERO FIELD LENGTH (SECURITY EOJ)
ZEROS	REPLACE BLANKS WITH (DISPLAY CODE) ZEROS, MULTIPLE FIELDS
ZSYSEQ	FORTRAN CALLABLE SYSTEM CALL

*** NSRDC5 ***

'NSRDC5' IS A LIBRARY OF DTNSRDC WRITTEN AND/OR SUPPORTED SCIENTIFIC AND UTILITY SUBPROGRAMS WRITTEN IN AND USING UNIQUE FEATURES OF FORTRAN 77.

REFERENCES: MOST OF THESE ROUTINES ARE DOCUMENTED IN CLIB/N, WHICH MAY BE OBTAINED FROM USER SERVICES.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2).

ROUTINES IN LIBRARY 'NSRDC5' INCLUDE:

AC	GET ACCOUNT NUMBER FOR THIS JOB
ALTYM	OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE START OF JOB (OR INTERCOM SESSION)
BANR	PRINT A BANNER (LETTERS ARE 10 LINES HIGH, LINES ARE 131 PRINT POSITIONS LONG)
BANR6	PRINT A BANNER (LETTERS ARE 6 LINES HIGH, LINES ARE 80 PRINT POSITIONS LONG)
CENTER	CENTER A CHARACTER STRING
CFIND	SCAN CHARACTER ARRAY FOR CHARACTER WORD
CHIN	CONVERT I-FORMATTED CHARACTER STRING TO INTEGER
CMMDUMP	DUMP COMMON MEMORY MANAGER (CMM) DYNAMIC AREA HEADERS AND TRAILER WITH OPTIONAL DUMP OF THE CONTENTS OF EACH BLOCK
CMMMERC	SUPPLY DESCRIPTION OF CMM MEMORY ERROR CODE
CMMOVEF	GET A LARGER AREA FROM CMM, MOVE OLD AREA TO NEW AREA, RELEASE OLD AREA AND RESET POINTERS
CMMPGFS	PRINT THE LARGEST BLOCK-SIZES AVAILABLE FOR ALL POSSIBLE CONDITIONS
CMMPGOS	PRINT THE CONTENTS OF THE ARRAY RETURNED BY SUBROUTINE CMMGOS
CMMPGSS	PRINT THE CONTENTS OF THE ARRAY RETURNED BY SUBROUTINE CMMGSS
CMMUERC	SUPPLY DESCRIPTION OF CMM USER ERROR CODE
CSHUFL	SHUFFLE A CHARACTER ARRAY
CSORT	SORT A CHARACTER ARRAY
CSORTD	SORT A CHARACTER ARRAY (DESCENDING)
CSORTN	SORT A CHARACTER ARRAY (HAVING AN ASSOCIATED NON-CHARACTER ARRAY)

CSORT2	SORT A CHARACTER ARRAY (HAVING AN ASSOCIATED CHARACTER ARRAY)
CVCHIN	CONVERT I-FORMATTED CHARACTER STRING TO INTEGER
CVCHOL	CONVERT CHARACTER STRING TO HOLLERITH STRING
CVHOCH	CONVERT HOLLERITH STRING TO CHARACTER STRING
CVINCH	CONVERT INTEGER TO CHARACTER STRING
DMPCPA	SHORT DUMP OF JOB CONTROL POINT AREA
DUMPXPK	DUMP EXCHANGE PACKAGE (REGISTERS, POINTERS, ETC.)
ELTYM	OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL
FIRSTCH	FIND FIRST NON-BLANK IN CHARACTER VARIABLE
FRSTCH	FIND FIRST NON-BLANK IN CHARACTER VARIABLE
GETSTR	EXTRACT CHARACTER STRING ACCORDING TO USER-DEFINED CRITERIA
HMS2S	CONVERT HH.MM.SS TO SECONDS
IDID	GET USER INITIALS AND INTERCOM USER ID FROM CHARGE CARD OR LOGIN
ITRANS	TRANSLATE CHARACTERS ACCORDING TO USER-SPECIFIED TRANSLATE TABLES
JOBORG	DETERMINE JOB ORIGIN
LASTCH	DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK
LASTCHH	DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK IN A HOLLERITH WORD OR ARRAY
LEFT	LEFT-JUSTIFY A CHARACTER STRING
LSTCH	DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK
MFRAME	OBTAIN THE MACHINE AND MAINFRAME RUNNING THE PROGRAM
MF2CPU	RETURN CPU NAME CORRESPONDING TO SUPPLIED MAINFRAME NAME
NEWDAT	ADD/SUBTRACT SPECIFIED NUMBER OF DAYS TO/FROM A GIVEN DATE
NUMER	TEST STRING FOR NUMERICS
PFRC	SUPPLY DESCRIPTION OF PERMANENT FILE FUNCTION RETURN CODE
PM	WRITE 'PM' PRINTER MESSAGE

PRTYM	GET AND PRINT CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL AND PRINT USER-SUPPLIED MESSAGE
RIGHT	RIGHT-JUSTIFY A CHARACTER STRING
ROUTERC	SUPPLY DESCRIPTION OF ROUTE RETURN CODE
SETREW	CONVERT REWIND OPTION INTO OPEN AND CLOSE CODES
SM5PRNT	PRINT CONTENTS OF SORT/MERGE 5 STATISTICS ARRAY
S2HMS	CONVERT SECONDS TO ' HH.MM.SS.'
TRANS	TRANSLATE CHARACTERS ACCORDING TO USER-SPECIFIED TRANSLATE TABLES
TTYMSG	DRIVER TO WRITE A LINE TO AN INTERACTIVE TERMINAL
TTYOPN	OPEN INTERACTIVE INPUT AND OUTPUT FILES

SANDIA

'SANDIA' IS A LIBRARY OF ORDINARY DIFFERENTIAL EQUATION SOLVERS OBTAINED FROM SANDIA LABORATORIES THROUGH THE ARGONNE CODE CENTER.

REFERENCE: SEE USER SERVICES.

ROUTINES IN LIBRARY 'SANDIA' INCLUDE:

DE	ORDINARY DIFFERENTIAL EQUATION SOLVER (DRIVER)
DEROOT	INTEGRATES AN INITIAL VALUE PROBLEM FOR ORDINARY DIFFERENTIAL EQUATIONS UNTIL A ROOT IS LOCATED (DRIVER)
STEP	ADAM'S INTEGRATION (USED DE AND DEROOT BUT MAY BE CALLED BY THE USER)

SPECIAL-PURPOSE SUBPROGRAM LIBRARIES

THE FOLLOWING ARE SPECIAL-PURPOSE PACKAGES OF SUBPROGRAMS. ROUTINES IN THE PACKAGES ARE NOT LISTED INDIVIDUALLY.

CALCFN	CALCOMP FUNCTIONAL PACKAGE
CALC936	BASIC PACKAGE FOR THE CALCOMP 936 PEN PLOTTER
CONMIN	SOLUTION OF LINEAR AND NO-LINEAR CONSTRAINED OPTIMIZATION PROBLEMS
DISSPLA	DISPLAY INTEGRATED SOFTWARE SYSTEM AND PLOTTING LANGUAGE
TEK30	TEKTRONIX PLOT PACKAGE FOR 40XX TERMINALS

***** CATALOGUED PROCEDURES *****

A CATALOGUED PROCEDURE IS A SET OF CONTROL CARDS WHICH ACCOMPLISH A TASK. THE COMPUTER CENTER MAINTAINS TWO LIBRARIES OF PROCEDURES: ONE FOR PROCEDURES DEALING WITH THE MAINTENANCE OF FILES ON THE MASS STORAGE SYSTEM, AND ONE FOR ALL OTHER PUBLIC-ACCESS PROCEDURES. THIS CHAPTER DESCRIBES THESE LIBRARIES AND LISTS THEIR CONTENTS WITH DESCRIPTIVE TITLES.

MOST PROCEDURES ARE EXECUTED BY:

BEGIN,<PROCNAME>,<PROCFIL>,<PARAMETERS>.

WHERE <PROCNAME> IS THE PROCEDURE NAME
<PROCFIL> IS THE PROCEDURE FILE
(OMITTED IF 'PROCFIL')
<PARAMETERS> IS 0 OR MORE PARAMETERS FOR THE PROCEDURE.

*** PROCFIL ***

'PROCFIL' IS A LIBRARY OF GENERAL-PURPOSE PROCEDURES WRITTEN AT DTNSRDC. THEY ARE EXECUTED BY:

BEGIN,<PROCNAME>,,<PARAMETERS>.

REFERENCES: CLIB/P, WHICH MAY BE OBTAINED FROM USER SERVICES.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2). MOST DOCUMENTS ARE 1 OR 2 PAGES LONG.

THE FOLLOWING PROCEDURES ARE AVAILABLE:

ADDEXT	MODIFY PRIVATE PACK DUM FILE FOR LEVEL 508 DUMPF/LOADPF
ANYLIB	EXECUTE A PROGRAM ON ANY EDITLIB USER LIBRARY
ANYPRO	EXECUTE A PROCEDURE ON ANY CATALOGUED PROCEDURE FILE
ANYPROS	EXECUTE A PROCEDURE ON ANY CATALOGUED SEQUENTIAL PROCEDURE FILE
ASCDOC	PRINT DOCUMENTS FOR ALL ROUTINES IN THE ASCII PACKAGE
ASCIIO	CREATE LABELLED COMMON BLOCKS FOR ASCII PACKAGE
AUDIT	SORTED (FAST) USER AUDIT

BANNERS	PRINT A PAGE WITH 1 TO 8 BANNERS
BDT	PRINT A BANNER PAGE WITH DATE AND TIME
BIGLOAD	CREATE AN ABSOLUTE FILE WHICH WILL ALLOW SOME LARGE PROGRAMS TO LOAD IN LESS CORE THAN NORMALLY NEEDED
CALC3D	THREE-D PROCEDURE FOR CALCOMP PLOTTERS
CCNOTE	PRINT A COMPUTER CENTER NOTE OR THE CCN INDEX
COMQ	PREPARE AND ROUTE A FILE TO THE MICROFICHE QUEUE
COPYBLK	REBLOCK STRANGER TAPES TO SCOPE STANDARD FILES (BOTH UNBLOCKED CARD AND PRINT LINE IMAGE TAPES AND BLOCKED STRANGER TAPES)
COPYLIB	CONDENSE (AND SORT) AN EDITLIB USER LIBRARY PRESERVING AL, FL, FLO VALUES. BINDEX AND LISTBIN LISTS ARE PROVIDED.
CV029	CONVERT TO 029 PUNCH CODE
DISPOST	INVOKE DISSPLA POSTPROCESSORS (TEK300 OR TEK480)
DOCADD	ADD ONE DOCUMENT TO A DOCUMENTATION FILE
DOCDATE	LIST DOCUMENT NAMES (ON *DECK CARDS) TOGETHER WITH THE DOCUMENT DATE AND PAGE NUMBERS (FROM BOTTOM LINE OF EACH PAGE)
DOCDELE	DELETE ONE DOCUMENT FROM A DOCUMENTATION FILE
DOCDOC	LIST DOCUMENTATION FOR PROCEDURES DOCADD, DOCDATE, DOCDELE, DOCDOC, DOCFILE, DOCGET, DOCLIST, DOCREPL
DOCFILE	ATTACH A DOCUMENTATION FILE
DOCGET	GET (EXTRACT) DOCUMENT(S) FROM A DOCUMENT FILE
DOCLIST	LIST DOCUMENT NAMES (ON *DECK CARDS) IN A DOCUMENTATION FILE
DOCREPL	REPLACE ONE DOCUMENT IN A DOCUMENTATION FILE
DSAUDIT	AUDIT DISKS ASSIGNED TO USER INITIALS
DSRLS	RELEASING OF ASSIGNED DISKS
D2A	CONVERT DISPLAY CODE FILE TO ASCII FOR FILE TRANSFER VIA NALCON/ARPANET
F45IT	SIMPLE CONVERSION OF FTN4 SOURCE TO FTN5

GETPROD	GET PRODUCTS FILE(S) FOR NOS/BE LEVELS 538, 518, 508, 461, 439, 434, 420, 414, 410, 406, 401, 380 FROM THE MASS STORAGE SYSTEM
GRIPE	ALLOW USER TO MAKE GRIPES OR SUGGESTIONS DIRECTLY TO THE COMPUTER
IDDS	PREPARE/EXAMINE GRAPHICALLY NUMERICAL DATA INPUT TO OR OUTPUT FROM A FORTRAN PROGRAM
LGOTREE	GENERATE CROSS-REFERENCE LISTS AND TREE STRUCTURE FROM BINARY RELOCATABLE OBJECT PROGRAM
LIBPRO	EXECUTE A PROCEDURE ON LIBRARY 'PROCFIL' CATALOGED UNDER ANY ID
LIBPROA	EXECUTE A PROCEDURE ON ANY CATALOGUED PROCEDURE LIBRARY
LIBSET1	CREATE SIMPLE ABSOLUTE USING ONE EDITLIB LIBRARY
LIBSET2	CREATE SIMPLE ABSOLUTE USING TWO EDITLIB LIBRARIES
LINE6	SET PRINT FILE TO 6 LINES PER INCH
LINE8	SET PRINT FILE TO 8 LINES PER INCH
LIST	LIST A PERMANENT FILE
MANUAL	PRINT ONE COPY OF A MANUAL OR ITS REVISION PAGES
MFX	TELL INTERACTIVE USER WHICH MAINFRAME HE IS USING
MNSRDC	EXECUTE A PROGRAM ON EDITLIB USER LIBRARY 'MNSRDC'
MYPRO	EXECUTE A PROCEDURE ON FILE 'PROCFIL' CATALOGED UNDER ANY ID
MYPROS	EXECUTE A PROCEDURE ON SEQUENTIAL FILE 'PROCFILS' CATALOGED UNDER ANY ID
NEWID	RENAME ID ON ONE PERMANENT FILE (BY COPYING THE FILE)
NOGO	CREATE SIMPLE ABSOLUTE FROM RELOCATABLE
NORERUN	INSURE THAT A BATCH JOB CANNOT BE RERUN BY OPERATOR TYPE-IN
OFLREQ	GENERATE AN OFF-LINE REQUEST (CALCOMP OR MICROFICHE)
PAC	PURGE ALL CYCLES OF A FILE
PAHC	PURGE ALL HIGH CYCLES WHILE RETAINING LOW CYCLE
PAKPAS	CHANGE PRIVATE PACK PASSWORDS, OPTIONALLY ADD EXTEND PASSWORD TO PRE-LEVEL 508 PACKS
PALC	PURGE ALL LOW CYCLES WHILE RETAINING HIGH CYCLE

PARMGET GENERATE SUBROUTINE 'PARMGET' TO PROCESS USER EXECUTE PARAMETERS FOR FTN5 PROGRAMS

PFRSTOR CREATE A FILE OF DIRECTIVES TO RESTORE PERMANENT FILES

PGMTAPE EXTRACT A SOURCE PROGRAM FROM TAPE

PHC PURGE HIGH CYCLE WHILE RETAINING LOW CYCLE

PLC PURGE LOW CYCLE WHILE RETAINING HIGH CYCLE

PM CREATE CERTAIN PRINT MESSAGE (PM) RECORDS

PROADD ADD ONE PROCEDURE TO A SEQUENTIAL PROCEDURE FILE

PROALL LIST PROCEDURE NAMES, PROCEDURE HEADERS AND THE PROCEDURES IN A SEQUENTIAL PROCEDURE FILE (COMBINES PRONAM, PROHDR AND PROLIST)

PRODELE DELETE ONE PROCEDURE FROM A SEQUENTIAL PROCEDURE FILE

PRODOC LIST DOCUMENTATION FOR PROCEDURES PROADD, PROALL, PRODELE, PRODOC, PROGET, PROHDR, PROLIST, PRONAM, PROREPL, PROS2R

PROGET GET (EXTRACT) ONE PROCEDURE FROM A SEQUENTIAL PROCEDURE FILE

PROGRAM EXECUTE A CATALOGED PROGRAM (NOT IN A LIBRARY)

PROHDR LIST PROCEDURE HEADERS IN A PROCEDURE FILE

PROLIST LIST PROCEDURE(S) IN A SEQUENTIAL PROCEDURE FILE

PRONAM LIST NAMES OF PROCEDURES IN A SEQUENTIAL PROCEDURE FILE

PROREPL REPLACE ONE PROCEDURE IN A SEQUENTIAL PROCEDURE FILE

PROS2R CONVERT SEQUENTIAL PROCEDURE FILE TO RANDOM EDITLIB USER LIBRARY

PURGALL PURGE PERMANENT FILES OF SPECIFIED AC AND ID (PUBLIC FILES OR ON A USER DEVICE SET)

PURGEN GENERATE PROCEDURE 'PUR' TO PURGE SEVERAL FILES WITH COMMON KERNEL

PURPOSE DRIVER TO EXTRACT PURPOSES FROM A DOCUMENT FILE

RECADD1 ADD ONE OR MORE LOGICAL RECORDS TO A FILE

RECDEL1 DELETE ONE OR MORE LOGICAL RECORDS FROM A FILE

RECDOC LIST DOCUMENTATION FOR PROCEDURES RECADD1, RECDEL1, RECDOC, RECGET1, RECREP1

RECGET1 EXTRACT ONE OR MORE LOGICAL RECORDS FROM A FILE

RECREP1 REPLACE ONE OR MORE LOGICAL RECORDS IN A FILE

RENAMAC	RENAME AC FIELD ON PERMANENT FILES OR MASS STORE FILES
RENAMID	RENAME ID ON ALL OF ONE USER'S PERMANENT FILES
RUNBAS	COMPILE AND EXECUTE BASIC PROGRAM (SIMILAR TO EDITOR RUN,BAS FOR USE OUTSIDE OF EDITOR)
RUNFTN	COMPILE AND EXECUTE FTN PROGRAM (SIMILAR TO EDITOR RUN,FTN FOR USE OUTSIDE OF EDITOR)
RUNFTN5	COMPILE AND EXECUTE FTN5 PROGRAM (SIMILAR TO EDITOR RUN,FTN5 FOR USE OUTSIDE OF EDITOR)
RUNMNF	COMPILE AND EXECUTE MNF PROGRAM UNDER INTERCOM
RUNPAS	COMPILE AND EXECUTE PASCAL PROGRAM UNDER INTERCOM
RUNSEQ	COMPILE AND EXECUTE FTN,SEQ PROGRAM (USES TS OPTION)
RUNTS	COMPILE AND EXECUTE FTN,TS PROGRAM
SEGLD	CREATE A SEGLOAD ABSOLUTE FILE
SEGO	SEGLOAD AND EXECUTE PROGRAM WITH OPTIONAL LIBRARY
SELDUMP	CREATE BACKUP DUMP TAPE OF THE USER PERMANENT FILES OF AN ACCOUNT NUMBER
SELLOAD	RESTORE SELECTED ROUTINES FROM A BACKUP DUMPF TAPE
SEND	SEND MESSAGES TO AN INTERCOM USER WHO IS NOT LOGGED IN; LIST MESSAGES
SORT	SORT (SORTMRG) UP TO 5 'DISPLAY' FIELDS USING 'COBOL6' COLLATING SEQUENCE ('FILE' CARDS REQUIRED)
SORTCZ	SORT (SORTMRG) UP TO 5 'DISPLAY' FIELDS USING 'COBOL6' COLLATING SEQUENCE ('FILE' CARDS NOT REQUIRED)
S2K260	ATTACH FILES FOR S2000 (VERSION 2.60) NATURAL LANGUAGE, FORTRAN, OR COBOL PROCEDURAL LANGUAGE INTERFACE.
S2K280	ATTACH FILES FOR S2000 (VERSION 2.80) SELF-CONTAINED LANGUAGES, REPORT PROCESSOR, FORTRAN OR COBOL PROGRAMMING LANGUAGE EXTENSION (PLEX).
TAPRD	COPY ONE OR MORE FILES FROM A FIXED LENGTH, BLOCKED STRANGER TAPE TO DISK
TAPWR	COPY A SEQUENTIAL FILE OR AN UPDATE PL ONTO A FIXED LENGTH, BLOCKED STRANGER TAPE
TIDBITS	LIST FILE OF TIDBITS (HINTS ON IMPROVED COMPUTER USAGE)

TPAUDIT	AUDIT TAPES ASSIGNED TO USER INITIALS
TPGET	AUTOMATICALLY OBTAIN TAPES FROM THE COMPUTER CENTER'S TAPE LIBRARY
TPRLS	RELEASE ASSIGNED TAPES
TRANPK	COPY CONTENTS FROM ONE DEVICE SET TO ANOTHER FOR BACKUP
UPDADD	ADD ONE DECK TO AN UPDATE LIBRARY
UPDDELE	DELETE ONE DECK FROM AN UPDATE LIBRARY
UPDDOC	LIST DOCUMENTATION FOR PROCEDURES UPDADD, UPDDELE, UPDDOC, UPDGET, UPDLIST, UPDREPL
UPDGET	EXTRACT ONE DECK FROM AN UPDATE LIBRARY (UPDATE,C) AND, OPTIONALLY, ADD EDITOR SEQUENCING
UPDGETS	EXTRACT ONE DECK FROM AN UPDATE LIBRARY (UPDATE,S) AND, OPTIONALLY, ADD EDITOR SEQUENCING
UPDGETT	EXTRACT ONE DECK FROM AN UPDATE LIBRARY (UPDATE,T) AND, OPTIONALLY, ADD EDITOR SEQUENCING
UPDLIST	LIST DECK/COMDECK NAMES IN UPDATE LIBRARY WITH COUNT OF RECORDS IN EACH DECK/COMDECK
UPDREPL	REPLACE ONE DECK IN AN UPDATE LIBRARY
UTILITY	EXECUTE A PROGRAM ON EDITLIB USER LIBRARY 'UTILITY'
VENUS	ATTACH AND EXECUTE ONE OF THE VENUS RETRIEVAL PROGRAMS
WHATLIB	LIST LIBRARIES SPECIFIED IN LAST 'LIBRARY' COMMAND
XEROX	ROUTE A COPY OF A FILE TO XEROX 8700

*** I ***

'I' IS A LIBRARY OF INTERACTIVE PROCEDURES WRITTEN AT DTNSRDC. THEY ARE EXECUTED BY:

BEGIN,<PROCNAME>,I,<PARAMETERS>.

-OR-

BEGIN,<PROCNAME>,I,?. <-- FOR INTERACTIVE PROMPTING

REFERENCES: CLIB/P, WHICH MAY BE OBTAINED FROM USER SERVICES.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2). MOST DOCUMENTS ARE 1 OR 2 PAGES LONG.

THE FOLLOWING PROCEDURES ARE AVAILABLE (NON-INTERACTIVE VERSIONS ARE IN LIBRARY 'PROCFIL'):

ASCDOC	PRINT DOCUMENTS FOR ALL ROUTINES IN THE ASCII PACKAGE
ASCII0	CREATE LABELLED COMMON BLOCKS FOR ASCII PACKAGE
DOCGET	GET (EXTRACT) DOCUMENT(S) FROM A DOCUMENT FILE
MANUAL	PRINT ONE COPY OF A MANUAL OR ITS REVISION PAGES
MSS2PF	MOVE ALL YOUR MSS FILES TO PF
NEWID	RENAME ID ON ONE PERMANENT FILE (BY COPYING THE FILE)
RENAMAC	RENAME AC FIELD ON PERMANENT FILES OR MASS STORE FILES
RENAMID	RENAME ID ON ALL OF ONE USER'S PERMANENT FILES
SEGLD	CREATE A SEGLOAD ABSOLUTE FILE
SEGO	SEGLOAD AND EXECUTE PROGRAM WITH OPTIONAL LIBRARY
XEROX	ROUTE A COPY OF A FILE TO XEROX 8700

*** MSS ***

'MSS' IS A LIBRARY OF PROCEDURES WRITTEN AT DTNSRDC FOR THE HANDLING OF FILES ON THE MASS STORAGE SYSTEM. THEY ARE EXECUTED BY:

BEGIN,<PROCNAME>,MSS,<PARAMETERS>.

REFERENCES: CLIB/P, WHICH MAY BE OBTAINED FROM USER SERVICES.

MACHINE-READABLE DOCUMENTATION MAY BE PRINTED USING PROCEDURE 'DOCGET' (SEE PAGE 1-2). MOST DOCUMENTS ARE 1 OR 2 PAGES LONG.

THE FOLLOWING PROCEDURES ARE AVAILABLE:

C2M	TRANSFER ONE CDC PERMANENT FILE (OF EXECUTING USER) TO MASS STORAGE SYSTEM (BASED ON USER'S CDC FILE TABLE/MFNPFN)
C2MALL	TRANSFER ALL CDC PERMANENT FILES (OF EXECUTING USER) TO MASS THE EXECUTING USER'S ID. IT SHOULD HAVE A TK PASSWORD.
FETCHC	GET CSYS OR PUBLIC FILES (FROM MSS, IF NECESSARY)
FETCHM	GET ANY FILE (FROM MSS, IF NECESSARY)
GETMFNS	DO MSAUDIT AND EXTRACT FILE NAMES
GETMS	TRANSFER ONE MSS FILE (OF EXECUTING USER) TO A CDC PERMANENT FILE
MF2MF	MOVE ALL FILES FROM ONE MAINFRAME TO ANOTHER VIA THE MASS STORAGE SYSTEM
MSAUDIT	SORTED LO=F OR FULL LO=FP AUDIT OF MSS FILES
MSSALL	GET DOCUMENTS DESCRIBING PROCEDURES RELATED TO THE MASS STORAGE SYSTEM (MSS)
MSS2PF	MOVE ALL YOUR MSS FILES TO PF
MSTABLE	GENERATE TABLE/MFNPFN INTERACTIVELY FOR MSS
M2C	TRANSFER ONE MSS FILE (OF EXECUTING USER) TO A CDC PERMANENT FILE (BASED ON USER'S CDC FILE TABLE/MFNPFN)
M2CALL	TRANSFER ALL MSS FILES (OF EXECUTING USER) TO CDC (BASED ON USER'S FILE TABLE/MFNPFN)
PUTMS	TRANSFER ONE CDC PERMANENT FILE (OF EXECUTING USER) TO THE MASS STORAGE SYSTEM

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