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centrum

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DEPARTMENT OF NUMERICAL MATHEMATICS JUNI

NUMAL, A LIBRARY OF NUMERICAL PROCEDURES IN ALGOL 60
VOLUME 0. GENERAL INFORMATION AND INDICES

second revision

2e boerhaavestraat 49 amsterdam

REVISION RECORD
2-ND REVISION, 1977

REASON FOR CHANGE:

EXTENSION OF THE LIBRARY;
CHANGES AND CORRECTIONS RESULTING FROM DOCUMENTATION EVALUATION

INSTRUCTIONS:

THE LAST REVISION OF THIS MANUAL WAS 1-ST REVISION, 1975.

THIS 2-ND REVISION AFFECTS THE FOLLOWING SECTIONS:

(FOR EACH SECTION ALL PAGES ARE MENTIONED TOGETHER WITH THE MONTH OF THEIR LATEST REVISION.)

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REVISION RECORD
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THIS CUMULATIVE REVISION RECORD MENTIONS ALL PAGES OF THE CURRENT NUMAL-DOCUMENTATION AND THE MONTH OF THEIR LATEST REVISION.

E.G.

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DENOTES THAT SECTION 1. 2. 4. (FIRST APPEARANCE MAY/1974) CONSISTS OF 6 PAGES; PAGE 4 WAS REVISED IN DEC/1975.

ALL PAGES THAT ARE NOT CONTAINED IN THIS LIST ARE OBSOLETE AND HAVE TO BE DELETED.

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THE LIBRARY

NUMAL

OF ALGOL 60 PROCEDURES IN NUMERICAL MATHEMATICS

PROGRAM TEXTS AND DOCUMENTATION

VOLUME 0	GENERAL INFORMATION AND INDICES
VOLUME 1	ELEMENTARY PROCEDURES
VOLUME 2	ALGEBRAIC EVALUATIONS
VOLUME 3	LINEAR ALGEBRA
VOLUME 4	ANALYTICAL EVALUATIONS
VOLUME 5	ANALYTICAL PROBLEMS
VOLUME 6	SPECIAL FUNCTIONS AND CONSTANTS
VOLUME 7	INTERPOLATION AND APPROXIMATION

MATHEMATICAL CENTRE , AMSTERDAM
2-ND REVISION, 1977

NO PART OF THE LIBRARY NUMAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM, OR TRANSMITTED, IN ANY FORM OR BY ANY MEANS, ELECTRONIC, PHOTOCOPYING, RECORDING, OR OTHERWISE, WITHOUT THE PRIOR WRITTEN PERMISSION OF THE ACADEMIC COMPUTING CENTRE AMSTERDAM (SARA) OR THE MATHEMATICAL CENTRE (AMSTERDAM).

THE LIBRARY

NUMAL

OF ALGOL 60 PROCEDURES IN NUMERICAL MATHEMATICS

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GENERAL INFORMATION AND INDICES

0 .1 GENERAL INFORMATION
0 .2 SYSTEMATICAL INDEX
0 .3 INDEX BY CODE NUMBER
0 .4 KWIC INDEX

INTRODUCTION.

AT THE REQUEST OF THE ACADEMIC COMPUTING CENTRE OF AMSTERDAM (SARA)THE MATHEMATICAL CENTRE HAS ADAPTED AND EXTENDED ITS LIBRARY OF NUMERICAL PROCEDURES FOR USE WITH THE CD CYBER 70 SYSTEM. THE RESULTING LIBRARY IS CALLED "NUMAL" ("NUM"ERICAL PROCEDURES IN "AL"GOL 60).

THE AIM OF NUMAL IS TO PROVIDE A HIGH LEVEL NUMERICAL LIBRARY FOR ALGOL 60 PROGRAMMERS. THE LIBRARY CONTAINS A SET OF VALIDATED NUMERICAL PROCEDURES TOGETHER WITH SUPPORTING DOCUMENTATION.
EXCEPT FOR A SMALL NUMBER OF DOUBLE PRECISION ARITHMETIC ROUTINES ALL THE SOURCE TEXTS ARE WRITTEN IN ALGOL 60 AND THEY ARE TO A HIGH DEGREE INDEPENDENT OF THE COMPUTOR/COMPILER USED.

THE LIBRARY IS UNDER CONTINUOUS DEVELOPMENT AND ,HENCE,ANY DESCRIPTION WILL BE AN INSTANTANEOUS ONE. THE MATHEMATICAL CENTRE WILL DISTRIBUTE UPDATINGS AND EXTENSIONS OF THE MANUAL ONCE A YEAR.

ORGANIZATION.

EACH PROCEDURE OF THE LIBRARY IS IDENTIFIED BY A NAME AND A CODE NUMBER. THE CODE NUMBER HAS TO BE USED WHEN, IN AN ALGOL 60 PROGRAM, REFERENCE IS MADE TO THE PRE-COMPILED PROCEDURE IN THE OBJECT CODE LIBRARY.
ALL PROCEDURES IN NUMAL ARE CLASSIFIED ACCORDING TO SUBJECT.
THE SUBJECTS ARE IDENTIFIED BY A SECTION NUMBER.
THE MANUAL IS ORDERED BY THESE SECTION NUMBERS.

IN ORDER TO FIND A PARTICULAR PROCEDURE, THERE IS A SYSTEMATICAL INDEX IN WHICH ALL PROCEDURES (THEIR NAMES AND THEIR CODE NUMBERS) ARE MENTIONED, CLASSIFIED BY THEIR SECTION NUMBER (I.E. BY SUBJECT).

FOR CROSS REFERENCING THERE IS AN INDEX BY CODE NUMBER, WHICH HAS REFERENCES TO PROCEDURE NAME AND SECTION NUMBER, AND THERE IS ALSO A KWIC INDEX IN WHICH KEYWORDS AND PROCEDURE NAMES HAVE BEEN ORDERED ALPHABETICALLY.

ORIGIN OF THE PROGRAMS.

THE MAJOR PART OF THE LIBRARY CONSISTS OF PROCEDURES THAT HAVE BEEN DEVELOPED AT THE MATHEMATICAL CENTRE. HOWEVER, SOME PROCEDURES ARE ADAPTED VERSIONS OF PROCEDURES PUBLISHED IN THE LITERATURE. IN PARTICULAR A NUMBER OF PROGRAMS ARE DERIVED FROM PROCEDURES PUBLISHED BY G.H. GOLUB AND C. REINSCH.

EDITORIAL BOARD.

NEW CONTRIBUTIONS CAN BE INSERTED IF THEY SATISFY THE STANDARDS AND IF THEY FIT INTO THE FRAMEWORK OF NUMAL. CONTRIBUTIONS CAN BE SUBMITTED TO ONE OF THE MEMBERS OF THE EDITORIAL BOARD:

C. DEN HEIJER
P. W. HEMKER
P.J. VAN DER HOUWEN
N.M. TEMME
D.T. WINTER

FURTHER INFORMATION CAN BE OBTAINED FROM P.W. HEMKER, MANAGING EDITOR OF THE NUMAL PROJECT.

LIST OF CONTRIBUTORS AND AUTHORS OF PROCEDURES IN NUMAL.

J.J.G. ADMIRAAL
M. BAKKER
P.A. BEENTJES
I. BRINK
J.C.P. BUS
T.M.T. COOLEN
K. DEKKER
T.J. DEKKER
H. FIOLET
H.N. GLORIE
F. GROEN
P.W. HEMKER
W. HOFFMANN
P.J. VAN DER HOUWEN
S.P.N. VAN KAMPEN
J.KOK
J. KOOPMAN
C.G. VAN DER LAAN
R. PLOEGER
C.J. ROOTHART
H.G.J. ROZENHART
E. SLAGT
N.M. TEMME
J.G. VERWER
M. VOORINTHOLT
D.T. WINTER
J. WOLLESWINKEL
A.C. YSSELSTEIN
J.A. ZONNEVELD

ACKNOWLEDGEMENTS.

THE LIBRARY NUMAL IS BEING DEVELOPED BY THE JOINT EFFORTS OF THE MEMBERS OF THE LIBRARY GROUP OF THE NUMERICAL MATHEMATICS DEPARTMENT OF THE MATHEMATICAL CENTRE. IN PARTICULAR, HOWEVER, WE WANT TO ACKNOWLEDGE THE MEMBERS F. GROEN, R. PISCAER, B. P. SOMMEIJER AND G.J.F. VINKESTEYN, WHO TOOK CARE OF FILE MANIPULATION, EDITING OF THE DOCUMENTATION FILES AND ADAPTION AND RUNNING OF THE KWIC INDEX PROGRAM.

P.W. HEMKER
MANAGING EDITOR

P.J. VAN DER HOUWEN
HEAD OF THE DEPT. OF NUMERICAL MATHEMATICS

CLASSIFIED ACCORDING TO SUBJECT, THIS INDEX CONTAINS THE NAMES OF THE PROCEDURES AND THE CORRESPONDING CODE NUMBERS. THE DOCUMENTATION OF THE PROCEDURES IS PRESENTED IN VOLUMES 1 THROUGH 7 AND IS ARRANGED ACCORDING TO SECTION NUMBERS, HENCE REFERENCE IS IMMEDIATE.

IN ADDITION TO THE CODENUMBER AND THE NAME OF EACH PROCEDURE THE MONTH OF FIRST APPEARANCE OF THE FINAL DOCUMENTATION IS LISTED.
A SEPARATE REVISION RECORD ENABLES THE USER TO CHECK WHETHER HIS MANUAL IS ACCURATELY UPDATED.

TO LOCATE A PIECE OF DOCUMENTATION IN MACHINE-READABLE FORM (E.G FOR USE WITH THE CD CYBER 70 SYSTEM) THE SYSTEMATICAL INDEX ALSO GIVES THE RECORD NUMBER (LEVEL 0) WHERE EACH PIECE OF DOCUMENTATION CAN BE FOUND ON THE DOCUMENTATION FILE (I.C. ON TAPE).

FOR USE WITH THE CD CYBER 70 SYSTEM, THE OBJECT CODE OF THE PROCEDURES IS AVAILABLE AND IT IS CONTAINED IN THE LIBRARY FILE "NUMAL3". THIS LIBRARY FILE CAN BE USED WHEN PROGRAMS COMPILED UNDER ALGOL 3 ARE LOADED.
FOR USE OF A LIBRARY FILE SEE E.G.
CDC SCOPE REF. MANUAL, CHAPTER6,
CDC INTERCOM REF. MANUAL, CHAPTER3, XEQ COMMAND.

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	BESS K	35174	OCT/75	255
	NONEXP BESS I0	35175	OCT/75	255
	NONEXP BESS I1	35176	OCT/75	255
	NONEXP BESS I	35177	OCT/75	255
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	BESS YAPLUSN	35182	OCT/75	249
	BESS PQA01	35183	OCT/75	249
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	BESS KA01	35191	OCT/75	251
	BESS KAPLUSN	35192	OCT/75	251
	NONEXP BESS IAPLUSN	35193	OCT/75	251
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	NONEXP BESS KAPLUSN	35195	OCT/75	251
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3.REAL FUNCTIONS IN 1 DIMENSION				
1.POLYNOMIALS				
8.NUMBER THEORY				
9.TABLE HANDLING				
	READ	39999	NOT YET AVAILABLE	
	WRITE	39998	NOT YET AVAILABLE	

OBSOLETE PROCEDURES

PROCEDURE	CODE	WITHDRAWAL	EXPIRATION	REPLACED BY
DET	34050	730901	750701	DEC(3,1,1,1,1,1,1),DETERM(3,1,1,1,1,1,2)
LSQDEC	34130	730901	750701	LSQORTDEC(3,1,1,2,1,1)
ERF	35020	740501	750701	ERRORFUNCTION(6,7)
RK1N	33011	740501	750701	RKE(5,2,1,1,1,1)
LINIGER1	33130	740915	750701	LINIGER1VS(5,2,1,1,1,2)
ABSMAXVEC	31060	750101	760101	INFNRMVEC(1,1,8)
MAXMAT	34230	750101	760101	ABSMAXMAT(1,1,8)
BESSELJ	35100	750101	750701	BESS J (6,9,1)
BESSELY	35101	750101	750701	BESS Y (6,9,1)
BESSELI	35102	750101	750701	BESS I (6,9,2)
BESSELK	35103	750101	750701	BESS K (6,9,2)
K0	35040	750101	750701	BESS K01 (6,9,2)
NONEXPBESSELI	35104	750101	750701	NONEXP BESS I (6,9,2)
NONEXPBESSELK	35105	750101	750701	NONEXP BESS K (6,9,2)
NONEXPK0	35038	750101	750701	NONEXP BESS K01 (6,9,2)
YA	35075	750101	750701	BESS YA01 (6,10,1)
YAPLUSN	35076	750101	750701	BESS YAPLUSN (6,10,1)
BESSELPQ	35077	750101	750701	BESS PQA01 (6,10,1)
KA	35071	750101	750701	BESS KA01 (6,10,2)
KAPLUSN	35072	750101	750701	BESS KAPLUSN (6,10,2)
NONEXPKA	35073	750101	750701	NONEXP BESS KA01(6,10,2)
NONEXPKAPLUSN	35074	750101	750701	NONEXP BESS KAPLUSN (6,10,2)

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30004	6. 2.	GIANT	* JAN/76
30005	6. 2.	INTCAP	* JAN/76
30006	6. 1.	PI	* JAN/76
30007	6. 1.	E	* JAN/76
30008	6. 2.	OVERFLOW	* JAN/76
30009	6. 2.	UNDERFLOW	* JAN/76
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30011	6. 3.	SETRANDOM	
31010	1. 1. 1.	INIVEC	* APR/74
31011	1. 1. 1.	INIMAT	* APR/74
31012	1. 1. 1.	INIMATD	* APR/74
31013	1. 1. 1.	INISYMD	APR/74
31014	1. 1. 1.	INISYMROW	APR/74
31020	1. 1. 3.	MULVEC	* APR/74
31021	1. 1. 3.	MULROW	* APR/74
31022	1. 1. 3.	MULCOL	* APR/74
31030	1. 1. 2.	DUPVEC	* APR/74
31031	1. 1. 2.	DUPVECROW	* APR/74
31032	1. 1. 2.	DUPROWVEC	* APR/74
31033	1. 1. 2.	DUPVECCOL	* APR/74
31034	1. 1. 2.	DUPCOLVEC	* APR/74
31035	1. 1. 2.	DUPMAT	* APR/74
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31041	2. 2. 1. 2.	NEWPOL	
31042	2. 2. 2. 2.	CHEPOL	OCT/75
31043	2. 2. 2. 2.	ALLCHEPOL	OCT/75
31044	2. 2. 2. 1.	ORTPOL	NOV/76
31045	2. 2. 2. 1.	ALLORTPOL	NOV/76
31046	2. 2. 2. 2.	CHEPOLSER	OCT/75
31047	2. 2. 2. 1.	SERORTPOL	NOV/76
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31054	2. 4. 2.	SUBPOL	
31055	2. 4. 2.	DIFPOL	
31057	2. 4. 2.	INTPOL	
31060	OBSOLETE PROCEDURE	ABSMAXVEC	
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31062	1. 1. 8.	INFNRMROW	* OCT/75
31063	1. 1. 8.	INFNRMCOL	* OCT/75
31064	1. 1. 8.	INFNRMMAT	* OCT/75
31065	1. 1. 8.	ONENRMVEC	* OCT/75
31066	1. 1. 8.	ONENRMROW	* OCT/75
31067	1. 1. 8.	ONENRMCOL	* OCT/75
31068	1. 1. 8.	ONENRMMAT	* OCT/75
31069	1. 1. 8.	ABSMAXMAT	* OCT/75
31070	1. 1. 4. 3.	HSHVECMAT	* JAN/76

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31072	1. 1. 4. 3.	HSHROWMAT	* JAN/76
31073	1. 1. 4. 3.	HSHVECTAM	* JAN/76
31074	1. 1. 4. 3.	HSHCOLTAM	* JAN/76
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31091	2. 2. 3. 1.	COSSER	OCT/74
31092	2. 2. 3. 1.	FOUSER	OCT/74
31093	2. 2. 3. 1.	FOUSER1	OCT/74
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31097	2. 2. 3. 1.	COMFOUSER2	OCT/74
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31101	1. 5. 1.	DP ADD	* MAR/77
31102	1. 5. 1.	DP SUB	* MAR/77
31103	1. 5. 1.	DP MUL	* MAR/77
31104	1. 5. 1.	DP DIV	* MAR/77
31105	1. 5. 1.	LNG ADD	* MAR/77
31106	1. 5. 1.	LNG SUB	* MAR/77
31107	1. 5. 1.	LNG MUL	* MAR/77
31108	1. 5. 1.	LNG DIV	* MAR/77
31109	1. 5. 1.	DP POW	MAR/77
31110	1. 5. 1.	LNG POW	MAR/77
31131	1. 1. 3.	COLCST	* APR/74
31132	1. 1. 3.	ROWCST	* APR/74
31200	1. 4.	LNGINTADD	OCT/74
31201	1. 4.	LNGINTSUBTRACT	OCT/74
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31203	1. 4.	LNGINTDIVIDE	OCT/74
31204	1. 4.	LNGINTPOWER	OCT/74
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31242	2. 2. 1. 1.	NORDERPOL	OCT/75
31243	2. 2. 1. 1.	DERPOL	OCT/75
31248	2. 4. 3.	INTCHS	OCT/74
31250	2. 4. 1.	POLCHS	
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31362	3. 6. 2.	ALLZERORTPOL	OCT/74
31363	3. 6. 2.	LUPZERORTPOL	OCT/74
31364	3. 6. 2.	SELZERORTPOL	OCT/74
31425	4. 2. 3.	GSSJACWGHTS	NOV/76
31427	4. 2. 3.	GSSLAGWGHTS	NOV/76
31500	1. 1. 4. 2.	FULMATVEC	* DEC/75
31501	1. 1. 4. 2.	FULTAMVEC	* DEC/75
31502	1. 1. 4. 2.	FULSYMMATVEC	DEC/75
31503	1. 1. 4. 2.	RESVEC	* DEC/75
31504	1. 1. 4. 2.	SYMRESVEC	DEC/75
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31506	1. 5. 2.	LNGFULTAMVEC	* JAN/76
31507	1. 5. 2.	LNGFULSYMMATVEC	JAN/76
31508	1. 5. 2.	LNGRESVEC	* JAN/76

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32020	4. 1.	SUMPOSSERIES	JUL/74
32051	4. 2. 1.	INTEGRAL	JUL/74
32070	4. 2. 1.	QADRAT	JUL/74
32075	4. 2. 2.	TRICUB	OCT/75
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33011	OBSOLETE PROCEDURE	RK1N	
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33013	5. 2. 1. 1. 2. 1.	RK2N	AUG/74
33014	5. 2. 1. 1. 2. 1.	RK3	AUG/74
33015	5. 2. 1. 1. 2. 1.	RK3N	AUG/74
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33017	5. 2. 1. 1. 1. 1.	RK4NA	AUG/74
33018	5. 2. 1. 1. 1. 1.	RK5NA	AUG/74
33033	5. 2. 1. 1. 1. 1.	RKE	DEC/75
33040	5. 2. 1. 1. 1. 3.	MODIFIED TAYLOR	AUG/74
33050	5. 2. 1. 1. 1. 3.	EXPONENTIALLY FITTED TAYLOR	AUG/74
33061	5. 2. 1. 1. 1. 1.	ARK	DEC/75
33066	5. 2. 1. 1. 3.	ARKMAT	NOV/76
33070	5. 2. 1. 1. 1. 1.	EFRK	AUG/74
33080	5. 2. 1. 1. 1. 1.	MULTISTEP	AUG/74
33120	5. 2. 1. 1. 1. 2.	EFERK	AUG/74
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33302	5. 2. 1. 2. 1. 2. 1. 2.	FEM LAG SKEW	JAN/76
33303	5. 2. 1. 2. 1. 2. 2. 1.	FEM HERM SYM	JAN/76
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34012	1. 1. 4. 1.	TAMVEC	* DEC/75
34013	1. 1. 4. 1.	MATMAT	* DEC/75
34014	1. 1. 4. 1.	TAMMAT	* DEC/75
34015	1. 1. 4. 1.	MATTAM	* DEC/75
34016	1. 1. 4. 1.	SEQVEC	* DEC/75
34017	1. 1. 4. 1.	SCAPRD1	* DEC/75
34018	1. 1. 4. 1.	SYMMATVEC	DEC/75
34020	1. 1. 5.	ELMVEC	* APR/74
34021	1. 1. 5.	ELMVECCOL	* APR/74
34022	1. 1. 5.	ELMCOLVEC	* APR/74
34023	1. 1. 5.	ELMCOL	* APR/74
34024	1. 1. 5.	ELMROW	* APR/74
34025	1. 1. 5.	MAXELMROW	* APR/74

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34027	1. 1. 5.	ELMROWVEC	* APR/74
34028	1. 1. 5.	ELMROWCOL	* APR/74
34029	1. 1. 5.	ELMCOLROW	* APR/74
34030	1. 1. 6.	ICHVEC	* APR/74
34031	1. 1. 6.	ICHCOL	* APR/74
34032	1. 1. 6.	ICHROW	* APR/74
34033	1. 1. 6.	ICHROWCOL	* APR/74
34034	1. 1. 6.	ICHSEQVEC	* APR/74
34035	1. 1. 6.	ICHSEQ	* APR/74
34040	1. 1. 7.	ROTCOL	* APR/74
34041	1. 1. 7.	ROTROW	* APR/74
34050	OBSOLETE PROCEDURE	DET	
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34053	3. 1. 1. 1. 1. 1. 4.	INV	MAY/74
34061	3. 1. 1. 1. 1. 1. 3.	SOLELM	MAY/74
34071	3. 1. 2. 1. 1. 1. 1. 3.	SOLBND	JUN/74
34130	OBSOLETE PROCEDURE	LSQDEC	
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34132	3. 1. 1. 2. 1. 1.	LSQDGLINV	MAY/74
34134	3. 1. 1. 2. 1. 1.	LSQORTDEC	MAY/74
34135	3. 1. 1. 2. 1. 2.	LSQORTDECSOL	MAY/74
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34140	3. 2. 1. 2. 1. 1.	TFMSYMTRI2	JUN/74
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34142	3. 2. 1. 2. 1. 1.	TFMPREVEC	JUN/74
34143	3. 2. 1. 2. 1. 1.	TFMSYMTRI1	JUN/74
34144	3. 2. 1. 2. 1. 1.	BAKSYMTRI1	JUN/74
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34151	3. 3. 1. 1. 1.	VALSYMTRI	JUL/74
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34154	3. 3. 1. 1. 2.	EIGSYM2	JUL/74
34155	3. 3. 1. 1. 2.	EIGVALSYM1	JUL/74
34156	3. 3. 1. 1. 2.	EIGSYM1	JUL/74
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34161	3. 3. 1. 1. 1.	QRISYMTRI	JUL/74
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34163	3. 3. 1. 1. 2.	QRISYM	JUL/74
34164	3. 3. 1. 1. 2.	QRIVALSYM1	JUL/74
34166	3. 3. 1. 1. 1.	RATQRI	
34170	3. 2. 1. 2. 1. 2.	TFMREAHES	JUN/74
34171	3. 2. 1. 2. 1. 2.	BAKREAHES1	JUN/74
34172	3. 2. 1. 2. 1. 2.	BAKREAHES2	JUN/74
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34174	3. 2. 1. 1. 1.	BAKLBR	JUN/74
34180	3. 3. 1. 2. 1.	REAVALQRI	JUL/74
34181	3. 3. 1. 2. 1.	REAVECHES	JUL/74
34182	3. 3. 1. 2. 2.	REAEIGVAL	JUL/74
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34184	3. 3. 1. 2. 2.	REAEIG1	JUL/74

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34186	3. 3. 1. 2. 1.	REAQRI	JUL/74
34187	3. 3. 1. 2. 2.	REAEIG3	JUL/74
34190	3. 3. 1. 2. 1.	COMVALQRI	JUL/74
34191	3. 3. 1. 2. 1.	COMVECHES	JUL/74
34192	3. 3. 1. 2. 2.	COMEIGVAL	JUL/74
34193	1. 2. 9.	COMSCL	DEC/75
34194	3. 3. 1. 2. 2.	COMEIG1	JUL/74
34195	3. 3. 1. 2. 2.	COMEIG2	
34200	5. 1. 1. 2. 3.	DAMPED NEWTON	
34202	5. 1. 1. 2. 3.	NEWRAP	
34203	5. 1. 2. 2. 4.	NEWTONMIN	
34210	5. 1. 2. 2. 1.	LINEMIN	DEC/75
34211	5. 1. 2. 2. 1.	RNK1UPD	DEC/75
34212	5. 1. 2. 2. 1.	DAVUPD	DEC/75
34213	5. 1. 2. 2. 1.	FLEUPD	DEC/75
34214	5. 1. 2. 2. 3.	RNK1MIN	DEC/75
34215	5. 1. 2. 2. 3.	FLEMIN	DEC/75
34220	3. 1. 2. 2. 1.	CONJ GRAD	JUN/74
34221	3. 1. 2. 2. 1.	CONJ RESI	
34230	OBSOLETE PROCEDURE	MAXMAT	
34231	3. 1. 1. 1. 1. 1. 1.	GSSELM	MAY/74
34232	3. 1. 1. 1. 1. 1. 3.	GSSSOL	MAY/74
34235	3. 1. 1. 1. 1. 1. 4.	INV1	MAY/74
34236	3. 1. 1. 1. 1. 1. 4.	GSSINV	MAY/74
34240	3. 1. 1. 1. 1. 1. 1.	ONENRMINV	MAY/74
34241	3. 1. 1. 1. 1. 1. 1.	ERBELM	MAY/74
34242	3. 1. 1. 1. 1. 1. 1.	GSSERB	MAY/74
34243	3. 1. 1. 1. 1. 1. 3.	GSSSOLERB	MAY/74
34244	3. 1. 1. 1. 1. 1. 4.	GSSINVERB	MAY/74
34250	3. 1. 1. 1. 1. 1. 5.	ITISOL	MAY/74
34251	3. 1. 1. 1. 1. 1. 5.	GSSITISOL	MAY/74
34252	3. 1. 1. 1. 1. 1. 1.	GSSNRI	MAY/74
34253	3. 1. 1. 1. 1. 1. 5.	ITISOLERB	MAY/74
34254	3. 1. 1. 1. 1. 1. 5.	GSSITISOLERB	MAY/74
34260	3. 2. 2. 1. 1.	HSHREABID	JUN/74
34261	3. 2. 2. 1. 1.	PSTTFMMAT	JUN/74
34262	3. 2. 2. 1. 1.	PRETFMMAT	JUN/74
34270	3. 5. 1. 1.	QRISNGVALBID	JUL/74
34271	3. 5. 1. 1.	QRISNGVALDECBID	JUL/74
34272	3. 5. 1. 2.	QRISNGVAL	JUL/74
34273	3. 5. 1. 2.	QRISNGVALDEC	JUL/74
34280	3. 1. 1. 3. 1. 1.	SOLSVDOVR	MAY/74
34281	3. 1. 1. 3. 1. 1.	SOLOVR	MAY/74
34282	3. 1. 1. 3. 1. 2.	SOLSVDUND	MAY/74
34283	3. 1. 1. 3. 1. 2.	SOLUND	MAY/74
34284	3. 1. 1. 3. 1. 3.	HOMSOLSVD	MAY/74
34285	3. 1. 1. 3. 1. 3.	HOMSOL	MAY/74
34286	3. 1. 1. 3. 1. 4.	PSDINVSVD	MAY/74
34287	3. 1. 1. 3. 1. 4.	PSDINV	MAY/74
34300	3. 1. 1. 1. 1. 1. 1.	DEC	MAY/74

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34301	3. 1. 1. 1. 1. 1. 3.	DECSOL	MAY/74
34302	3. 1. 1. 1. 1. 1. 4.	DECINV	MAY/74
34303	3. 1. 1. 1. 1. 1. 2.	DETERM	MAY/74
34310	3. 1. 1. 1. 1. 2. 1.	CHLDEC2	MAY/74
34311	3. 1. 1. 1. 1. 2. 1.	CHLDEC1	MAY/74
34312	3. 1. 1. 1. 1. 2. 2.	CHLDETERM2	MAY/74
34313	3. 1. 1. 1. 1. 2. 2.	CHLDETERM1	MAY/74
34320	3. 1. 2. 1. 1. 1. 1. 1.	DECBND	JUN/74
34321	3. 1. 2. 1. 1. 1. 1. 2.	DETERMBND	JUN/74
34322	3. 1. 2. 1. 1. 1. 1. 3.	DECSOLBND	JUN/74
34330	3. 1. 2. 1. 1. 2. 1. 1.	CHLDECBND	JUN/74
34331	3. 1. 2. 1. 1. 2. 1. 2.	CHLDETERMBND	JUN/74
34332	3. 1. 2. 1. 1. 2. 1. 3.	CHLSOLBND	JUN/74
34333	3. 1. 2. 1. 1. 2. 1. 3.	CHLDECSOLBND	JUN/74
34340	1. 3. 1.	COMABS	MAY/74
34341	1. 3. 2.	COMMUL	MAY/74
34342	1. 3. 2.	COMDIV	MAY/74
34343	1. 3. 1.	COMSQRT	MAY/74
34344	1. 3. 1.	CARPOL	MAY/74
34345	3. 6. 3.	COMKWD	JUL/74
34352	1. 2. 3.	COMCOLCST	MAY/74
34353	1. 2. 3.	COMROWCST	MAY/74
34354	1. 2. 4.	COMMATVEC	MAY/74
34355	1. 2. 4.	HSHCOMCOL	MAY/74
34356	1. 2. 4.	HSHCOMPRD	MAY/74
34357	1. 2. 7.	ROTCOMCOL	JAN/76
34358	1. 2. 7.	ROTCOMROW	JAN/76
34359	1. 2. 8.	COMEUCNRM	DEC/75
34360	1. 2. 9.	SCLCOM	DEC/75
34361	3. 2. 1. 1. 2.	EQILBRCOM	JUN/74
34362	3. 2. 1. 1. 2.	BAKLBRCOM	JUN/74
34363	3. 2. 1. 2. 2. 1.	HSHHRMTRI	JUN/74
34364	3. 2. 1. 2. 2. 1.	HSHHRMTRIVAL	JUN/74
34365	3. 2. 1. 2. 2. 1.	BAKHRMTRI	JUN/74
34366	3. 2. 1. 2. 2. 2.	HSHCOMHES	JUN/74
34367	3. 2. 1. 2. 2. 2.	BAKCOMHES	JUN/74
34368	3. 3. 2. 1.	EIGVALHRM	JUL/74
34369	3. 3. 2. 1.	EIGHRM	JUL/74
34370	3. 3. 2. 1.	QRIVALHRM	JUL/74
34371	3. 3. 2. 1.	QRIHRM	JUL/74
34372	3. 3. 2. 2. 1.	VALQRICOM	JUL/74
34373	3. 3. 2. 2. 1.	QRICOM	JUL/74
34374	3. 3. 2. 2. 2.	EIGVALCOM	JUL/74
34375	3. 3. 2. 2. 2.	EIGCOM	JUL/74
34376	1. 2. 5.	ELMCOMVECCOL	MAY/74
34377	1. 2. 5.	ELMCOMCOL	MAY/74
34378	1. 2. 5.	ELMCOMROWVEC	MAY/74
34390	3. 1. 1. 1. 1. 2. 3.	CHLSOL2	MAY/74
34391	3. 1. 1. 1. 1. 2. 3.	CHLSOL1	MAY/74
34392	3. 1. 1. 1. 1. 2. 3.	CHLDECSOL2	MAY/74
34393	3. 1. 1. 1. 1. 2. 3.	CHLDECSOL1	MAY/74

CODE	SECTION	PROCEDURE	MNT/YR
34400	3. 1. 1. 1. 1. 2. 4.	CHLINV2	MAY/74
34401	3. 1. 1. 1. 1. 2. 4.	CHLINV1	MAY/74
34402	3. 1. 1. 1. 1. 2. 4.	CHLDECINV2	MAY/74
34403	3. 1. 1. 1. 1. 2. 4.	CHLDECINV1	MAY/74
34410	1. 5. 2.	LNGVECVEC	* JAN/76
34411	1. 5. 2.	LNGMATVEC	* JAN/76
34412	1. 5. 2.	LNGTAMVEC	* JAN/76
34413	1. 5. 2.	LNGMATMAT	* JAN/76
34414	1. 5. 2.	LNGTAMMAT	* JAN/76
34415	1. 5. 2.	LNGMATTAM	* JAN/76
34416	1. 5. 2.	LNGSEQVEC	* JAN/76
34417	1. 5. 2.	LNGSCAPRD1	* JAN/76
34418	1. 5. 2.	LNGSYMMATVEC	JAN/76
34420	3. 1. 2. 1. 1. 2. 2. 1.	DECSYMTRI	JUN/74
34421	3. 1. 2. 1. 1. 2. 2. 3.	SOLSYMTRI	JUN/74
34422	3. 1. 2. 1. 1. 2. 2. 3.	DECSOLSYMTRI	JUN/74
34423	3. 1. 2. 1. 1. 1. 2. 1.	DECTRI	JUN/74
34424	3. 1. 2. 1. 1. 1. 2. 3.	SOLTRI	JUN/74
34425	3. 1. 2. 1. 1. 1. 2. 3.	DECSOLTRI	JUN/74
34426	3. 1. 2. 1. 1. 1. 2. 1.	DECTRIPIV	JUN/74
34427	3. 1. 2. 1. 1. 1. 2. 3.	SOLTRIPIV	JUN/74
34428	3. 1. 2. 1. 1. 1. 2. 3.	DECSOLTRIPIV	JUN/74
34430	5. 1. 1. 2. 2.	QUANEWBND	OCT/74
34431	5. 1. 1. 2. 2.	QUANEWBND1	OCT/74
34432	5. 1. 2. 2. 2.	PRAXIS	OCT/75
34433	5. 1. 2. 1. 1.	MININ	OCT/75
34435	5. 1. 2. 1. 2.	MININDER	OCT/75
34436	5. 1. 1. 1. 1.	ZEROINRAT	OCT/75
34437	4. 3. 2. 1.	JACOBNNF	OCT/74
34438	4. 3. 2. 1.	JACOBNMF	OCT/74
34439	4. 3. 2. 1.	JACOBNBNDF	OCT/74
34440	5. 1. 3. 1. 3.	MARQUARDT	DEC/75
34441	5. 1. 3. 1. 3.	GSSNEWTON	DEC/75
34444	5. 2. 1. 3. 1.	PEIDE	OCT/75
34450	5. 1. 1. 2. 2.	BROWNLS	
34451	5. 1. 1. 2. 2.	QUANEW	
34452	5. 1. 1. 2. 2.	QUANEW1	
34453	5. 1. 1. 1. 2.	ZEROINDER	OCT/75
34500	3. 6. 1.	POLZEROS	OCT/74
34600	3. 4. 1. 2.	QZIVAL	JAN/76
34601	3. 4. 1. 2.	QZI	JAN/76
34602	3. 4. 1. 2.	HSHDECMUL	JAN/76
34603	3. 4. 1. 2.	HESTGL3	JAN/76
34604	3. 4. 1. 2.	HESTGL2	JAN/76
34605	3. 4. 1. 2.	HSH2COL	JAN/76
34606	3. 4. 1. 2.	HSH3COL	JAN/76
34607	3. 4. 1. 2.	HSH2ROW3	JAN/76
34608	3. 4. 1. 2.	HSH2ROW2	JAN/76
34609	3. 4. 1. 2.	HSH3ROW3	JAN/76
34610	3. 4. 1. 2.	HSH3ROW2	JAN/76
34611	1. 2. 7.	CHSH2	JAN/76

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34700	3. 1. 1. 1. 1. 3. 1.	SYMDEC2	JAN/76
34701	3. 1. 1. 1. 1. 3. 1.	SYMDEC1	JAN/76
34702	3. 1. 1. 1. 1. 3. 2.	SYMDETERM2	JAN/76
34703	3. 1. 1. 1. 1. 3. 2.	SYMDETERM1	JAN/76
34704	3. 1. 1. 1. 1. 3. 3.	SYMSOL2	JAN/76
34705	3. 1. 1. 1. 1. 3. 3.	SYMSOL1	JAN/76
34706	3. 1. 1. 1. 1. 3. 3.	SYMDECSOL2	JAN/76
34707	3. 1. 1. 1. 1. 3. 3.	SYMDECSOL1	JAN/76
34708	3. 1. 1. 1. 1. 3. 4.	SYMINV2	JAN/76
34709	3. 1. 1. 1. 1. 3. 4.	SYMINV1	JAN/76
34710	3. 1. 1. 1. 1. 3. 4.	SYMDECINV2	JAN/76
34711	3. 1. 1. 1. 1. 3. 4.	SYMDECINV1	JAN/76
35020	OBSOLETE PROCEDURE	ERF	
35021	6. 7.	ERRORFUNCTION	OCT/74
35022	6. 7.	NONEXPERFC	OCT/74
35023	6. 7.	INVERSE ERROR FUNCTION	OCT/74
35027	6. 7.	FRESNEL	OCT/74
35028	6. 7.	FG	OCT/74
35030	6. 6.	INCOMGAM	SEP/74
35038	OBSOLETE PROCEDURE	NONEXPKO	
35040	OBSOLETE PROCEDURE	KO	
35050	6. 6.	INCBETA	SEP/74
35051	6. 6.	IBPPLUSN	SEP/74
35052	6. 6.	IBQPLUSN	SEP/74
35053	6. 6.	IXQFIX	SEP/74
35054	6. 6.	IXPFIX	SEP/74
35055	6. 6.	FORWARD	SEP/74
35056	6. 6.	BACKWARD	SEP/74
35060	6. 6.	RECIP GAMMA	SEP/74
35061	6. 6.	GAMMA	SEP/74
35062	6. 6.	LOG GAMMA	SEP/74
35071	OBSOLETE PROCEDURE	KA	
35072	OBSOLETE PROCEDURE	KAPLUSN	
35073	OBSOLETE PROCEDURE	NONEXPKA	
35074	OBSOLETE PROCEDURE	NONEXPKAPLUSN	
35075	OBSOLETE PROCEDURE	YA	
35076	OBSOLETE PROCEDURE	YAPLUSN	
35077	OBSOLETE PROCEDURE	BESSELPQ	
35080	6. 5. 1.	EI	SEP/74
35081	6. 5. 1.	EI ALPHA	SEP/74
35083	2. 3.	JFRAC	MAY/74
35084	6. 5. 2.	SINCOSINT	SEP/74
35085	6. 5. 2.	SINCOSFG	SEP/74
35086	6. 5. 1.	ENX	SEP/74
35087	6. 5. 1.	NONEXP ENX	SEP/74
35100	OBSOLETE PROCEDURE	BESSELJ	
35101	OBSOLETE PROCEDURE	BESSELY	
35102	OBSOLETE PROCEDURE	BESSELI	
35103	OBSOLETE PROCEDURE	BESSELK	
35104	OBSOLETE PROCEDURE	NONEXPBESSELI	
35105	OBSOLETE PROCEDURE	NONEXPBESSELK	

CODE	SECTION	PROCEDURE	MNT/YR
35111	6. 4. 2.	SINH	SEP/74
35112	6. 4. 2.	COSH	SEP/74
35113	6. 4. 2.	TANH	SEP/74
35114	6. 4. 2.	ARCSINH	SEP/74
35115	6. 4. 2.	ARCCOSH	SEP/74
35116	6. 4. 2.	ARCTANH	SEP/74
35120	6. 4. 1.	TAN	SEP/74
35121	6. 4. 1.	ARCSIN	SEP/74
35122	6. 4. 1.	ARCCOS	SEP/74
35140	6.10. 4.	AIRY	OCT/75
35145	6.10. 4.	AIRYZEROS	OCT/75
35150	6.10. 3.	SPHER BESS J	OCT/75
35151	6.10. 3.	SPHER BESS Y	OCT/75
35152	6.10. 3.	SPHER BESS I	OCT/75
35153	6.10. 3.	SPHER BESS K	OCT/75
35154	6.10. 3.	NONEXP SPHER BESS I	OCT/75
35155	6.10. 3.	NONEXP SPHER BESS K	OCT/75
35160	6. 9. 1.	BESS J0	OCT/75
35161	6. 9. 1.	BESS J1	OCT/75
35162	6. 9. 1.	BESS J	OCT/75
35163	6. 9. 1.	BESS Y01	OCT/75
35164	6. 9. 1.	BESS Y	OCT/75
35165	6. 9. 1.	BESS PQ0	OCT/75
35166	6. 9. 1.	BESS PQ1	OCT/75
35170	6. 9. 2.	BESS I0	OCT/75
35171	6. 9. 2.	BESS I1	OCT/75
35172	6. 9. 2.	BESS I	OCT/75
35173	6. 9. 2.	BESS K01	OCT/75
35174	6. 9. 2.	BESS K	OCT/75
35175	6. 9. 2.	NONEXP BESS I0	OCT/75
35176	6. 9. 2.	NONEXP BESS I1	OCT/75
35177	6. 9. 2.	NONEXP BESS I	OCT/75
35178	6. 9. 2.	NONEXP BESS K01	OCT/75
35179	6. 9. 2.	NONEXP BESS K	OCT/75
35180	6.10. 1.	BESS JAPLUSN	OCT/75
35181	6.10. 1.	BESS YA01	OCT/75
35182	6.10. 1.	BESS YAPLUSN	OCT/75
35183	6.10. 1.	BESS PQA01	OCT/75
35190	6.10. 2.	BESS IAPLUSN	OCT/75
35191	6.10. 2.	BESS KA01	OCT/75
35192	6.10. 2.	BESS KAPLUSN	OCT/75
35193	6.10. 2.	NONEXP BESS IAPLUSN	OCT/75
35194	6.10. 2.	NONEXP BESS KA01	OCT/75
35195	6.10. 2.	NONEXP BESS KAPLUSN	OCT/75
36010	7. 1. 1. 1. 1.	NEWTON	SEP/74
36020	7. 1. 3. 2. 1.	INI	DEC/75
36021	7. 1. 3. 2. 1.	SNDREMEZ	DEC/75
36022	7. 1. 3. 2. 1.	MINMAXPOL	OCT/75
36401	3. 3. 1. 1. 3. 3.	SYMEIGINP	NOV/76
36402	3. 3. 1. 1. 3. 2.	ORTHOG	NOV/76
36403	3. 3. 1. 1. 3. 1.	ROWPERM	NOV/76

CODE	SECTION	PROCEDURE	MNT/YR
36404	3. 3. 1. 1. 3. 1.	VECPERM	NOV/76
36405	3. 3. 1. 1. 3. 1.	MERGESORT	NOV/76
39998	9.	WRITE	
39999	9.	READ	

IN THIS KEY WORD IN CONTEXT (KWIC) INDEX KEY WORDS AND PROCEDURE NAMES ARE ORDERED ALPHABETICALLY.

THE KWIC INDEX IS BASED UPON PROGRAM ABSTRACT SUCH AS:

32070 #QADRAT (#QUADRATURE) COMPUTES THE #DEFINITE #INTEGRAL OF A #FUNCTION OF ONE VARIABLE OVER A FINITE INTERVAL.

THE ABSTRACT COMPRISES THE CODE NUMBER AND A SHORT DESCRIPTION OF THE PROGRAM (ITS NAME, WHAT IT DOES, AND HOW IT DOES IT).
THE "IMPORTANT" WORDS (PRECEDED BY A # IN THE ABOVE EXAMPLE) ARE USED AS KEY WORDS IN THE KWIC INDEX.
THE FIRST APPEARANCE OF OUR ABOVE EXAMPLE ABSTRACT IN THE KWIC INDEX IS:

QADRAT COMPUTES THE .DEFINITE INTEGRAL OF A FUNCTION OF ONE
VARIABLE OVER A FINITE INTERVAL. 32070 133

IF THIS PROGRAM (QADRAT) IS OF INTEREST, YOU CAN LOCATE IT BY MEANS OF ITS CODE NUMBER (32070).
IN CASE AN ENTRY IN THE KWIC INDEX IS NOT COMPLETELY READABLE (I.E. TRUNCATED AT AN END OF THE LINE), YOU CAN FIND A COMPLETE LISTING (BY CODE NUMBER) OF ALL THE ABSTRACTS FOLLOWING THE KWIC INDEX.

SINCE ALL PROCEDURE NAMES HAVE BEEN INSERTED AS KEYWORDS, THE KWIC INDEX CAN ALSO BE USED TO TRACE A PROCEDURE BY ITS NAME.

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GSSLAGWGHTS COMPUTES THE	ABSCISSAE AND WEIGHTS FOR GAUSS- LAGRANGE QUADRATURE.	31427	291
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RIABLE ORDER MULTISTEP METHOD	ADAMS-MOULTON, ADAMS-BASHFORTH OR GEAR'S METHOD; THE ORDER OF ACCURACY IS AUTOMATIC,	33080	151
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ELMCOMVECCOL	ADDS A COMPLEX NUMBER TIMES A COMPLEX COLUMN VECTOR TO A COMPLEX VECTOR.	34376	25
ELMCOMROWVEC	ADDS A COMPLEX NUMBER TIMES A COMPLEX VECTOR TO A COMPLEX ROW VECTOR.	34378	25
ELMCOL	ADDS A CONSTANT TIMES A COLUMN VECTOR TO A COLUMN VECTOR.	34023	9
ELMROWCOL	ADDS A CONSTANT TIMES A COLUMN VECTOR TO A ROW VECTOR.	34028	9
ELMVECCOL	ADDS A CONSTANT TIMES A COLUMN VECTOR TO A VECTOR.	34021	9
ELMCOLROW	ADDS A CONSTANT TIMES A ROW VECTOR TO A COLUMN VECTOR.	34029	9
ELMROW	ADDS A CONSTANT TIMES A ROW VECTOR TO A ROW VECTOR.	34024	9
MAXELMROW	ADDS A CONSTANT TIMES A ROW VECTOR TO A ROW VECTOR, MAXELMROW:=THE SUBSCRIPT OF AN E	34025	9
ELMVECROW	ADDS A CONSTANT TIMES A ROW VECTOR TO A VECTOR.	34026	9
ELMCOLVEC	ADDS A CONSTANT TIMES A VECTOR TO A COLUMN VECTOR.	34022	9
ELMROWVEC	ADDS A CONSTANT TIMES A VECTOR TO A ROW VECTOR.	34027	9
ELMVEC	ADDS A CONSTANT TIMES A VECTOR TO A VECTOR.	34020	9
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30002 275 ARREB DELIVERS THE ARITHMETIC ERROR BOUND OF THE COMPUTOR.
30003 275 DWARF DELIVERS THE SMALLEST (IN ABSOLUTE VALUE) REPRESENTABLE REAL NUMBER.
30004 275 GIANT DELIVERS THE LARGEST REPRESENTABLE REAL NUMBER.
30005 275 INTCAP DELIVERS THE INTEGER CAPACITY.
30006 273 PI DELIVERS A FULL PRECISION APPROXIMATION TO PI= 3.14...
30007 273 E DELIVERS A FULL PRECISION APPROXIMATION TO E= 2.718...
30008 275 OVERFLOW TESTS WHETHER A VALUE IS AN OVERFLOW VALUE.
30009 275 UNDERFLOW TESTS WHETHER A VALUE IS AN UNDERFLOW VALUE.
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31011 1 INIMAT INITIALIZES A MATRIX WITH A CONSTANT.
31012 1 INIMATD INITIALIZES A (CO)DIAGONAL OF A MATRIX.
31013 1 INISYMD INITIALIZES A (CO)DIAGONAL OF A SYMMETRIC MATRIX, WHOSE UPPERTRIANGLE IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
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31020 5 MULVEC STORES A CONSTANT MULTIPLIED BY A VECTOR INTO A VECTOR.
31021 5 MULROW STORES A CONSTANT MULTIPLIED BY A ROW VECTOR INTO A ROW VECTOR.
31022 5 MULCOL STORES A CONSTANT MULTIPLIED BY A COLUMN VECTOR INTO A COLUMN VECTOR.
31030 3 DUPVEC COPIES A VECTOR INTO ANOTHER VECTOR.
31031 3 DUPVECROW COPIES A ROW VECTOR INTO A VECTOR.
31032 3 DUPROWVEC COPIES A VECTOR INTO A ROW VECTOR.
31033 3 DUPVECCOL COPIES A COLUMN VECTOR INTO A VECTOR.
31034 3 DUPCOLVEC COPIES A VECTOR INTO A COLUMN VECTOR.
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31042 229 CHEPOL EVALUATES A CHEBYSHEV POLYNOMIAL.
31043 229 ALLCHEPOL EVALUATES ALL CHEBYSHEV POLYNOMIALS UP TO A CERTAIN DEGREE.
31044 293 ORTPOL EVALUATES THE VALUE OF AN N-DEGREE ORTHOGONAL POLYNOMIAL, GIVEN BY A SET OF RECURRENCE COEFFICIENTS.
31045 293 ALLORTPOL EVALUATES THE VALUE OF ALL ORTHOGONAL POLYNOMIALS UP TO A GIVEN DEGREE, GIVEN A SET OF RECURRENCE COEFFICIENTS.
31046 229 CHEPOLSER EVALUATES A CHEBYSHEV SERIES.
31047 293 SERORTPOL EVALUATES A FINITE SERIES EXPRESSED IN ORTHOGONAL POLYNOMIALS, GIVEN BY A SET OF RECURRENCE COEFFICIENTS.
31050 43 NEWGRN TRANSFORMS A POLYNOMIAL FROM THE NEWTON FORM INTO THE GRUNERT FORM.
31061 241 INFNRMVEC CALCULATES THE INFINITY-NORM OF A VECTOR.
31062 241 INFNRMROW CALCULATES THE INFINITY-NORM OF A ROW VECTOR.
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31064 241 INFNRMMAT CALCULATES THE INFINITY-NORM OF A MATRIX.
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31066 241 ONENRMROW CALCULATES THE 1-NORM OF A ROW VECTOR.
31067 241 ONENRMCOL CALCULATES THE 1-NORM OF A COLUMN VECTOR.
31068 241 ONENRMMAT CALCULATES THE 1-NORM OF A MATRIX.
31069 241 ABSMAXMAT CALCULATES THE MODULUS OF THE LARGEST ELEMENT OF A MATRIX AND DELIVERS THE INDICES OF THE MAXIMAL ELEMENT.
31070 269 HSHVECMAT PREMULTIPLIES A MATRIX BY A HOUSEHOLDER MATRIX, THE VECTOR DEFINING THIS HSH MATRIX BEING GIVEN IN A ONE-DIMENSIONAL ARRAY.
31071 269 HSHCOLMAT PREMULTIPLIES A MATRIX BY A HOUSEHOLDER MATRIX, THE VECTOR DEFINING THIS HSH MATRIX BEING GIVEN AS A COLUMN IN A TWO-DIMENSIONAL ARRAY.
31072 269 HSHROWMAT PREMULTIPLIES A MATRIX BY A HOUSEHOLDER MATRIX, THE VECTOR DEFINING THIS HSH MATRIX BEING GIVEN AS A ROW IN A TWO-DIMENSIONAL ARRAY.
31073 269 HSHVECTAM POSTMULTIPLIES A MATRIX BY A HOUSEHOLDER MATRIX, THE VECTOR DEFINING THIS HSH MATRIX BEING GIVEN IN A ONE-DIMENSIONAL ARRAY.
31074 269 HSHCOLTAM POSTMULTIPLIES A MATRIX BY A HOUSEHOLDER MATRIX, THE VECTOR DEFINING THIS HSH MATRIX BEING GIVEN AS A COLUMN IN A TWO-DIMENSIONAL ARRAY.
31075 269 HSHROWTAM POSTMULTIPLIES A MATRIX BY A HOUSEHOLDER MATRIX, THE VECTOR DEFINING THIS HSH MATRIX BEING GIVEN AS A ROW IN A TWO-DIMENSIONAL ARRAY.
31090 203 SINSER EVALUATES A SINE SERIES.
31091 203 COSSER EVALUATES A COSINE SERIES.

31092 203 FOUSER EVALUATES A FOURIER SERIES WITH EQUAL SINE AND COSINE COEFFICIENTS.
31093 203 FOUSER1 EVALUATES A FOURIER SERIES.
31094 203 FOUSER2 EVALUATES A FOURIER SERIES.
31095 203 COMFOUSER EVALUATES A COMPLEX FOURIER SERIES WITH REAL COEFFICIENTS.
31096 203 COMFOUSER1 EVALUATES A COMPLEX FOURIER SERIES.
31097 203 COMFOUSER2 EVALUATES A COMPLEX FOURIER SERIES.
31100 289 LNGREATODECI CONVERTS A DOUBLE PRECISION NUMBER TO ITS DECIMAL REPRESENTATION.
31101 271 DPADD ADDS TWO SINGLE PRECISION NUMBERS TO A DOUBLE PRECISION SUM.
31102 271 DPSUB SUBTRACTS TWO SINGLE PRECISION NUMBERS TO A DOUBLE PRECISION DIFFERENCE.
31103 271 DPMUL MULTIPLIES TWO SINGLE PRECISION NUMBERS TO A DOUBLE PRECISION PRODUCT.
31104 271 DPDIV DIVIDES TWO SINGLE PRECISION NUMBERS TO A DOUBLE PRECISION QUOTIENT.
31105 271 LNGADD ADDS TWO DOUBLE PRECISION NUMBERS.
31106 271 LNGSUB SUBTRACTS TWO DOUBLE PRECISION NUMBERS.
31107 271 LNGMUL MULTIPLIES TWO DOUBLE PRECISION NUMBERS.
31108 271 LNGDIV DIVIDES TWO DOUBLE PRECISION NUMBERS.
31109 271 DPPOW COMPUTES THE DOUBLE PRECISION POWER OF A SINGLE PRECISION NUMBER.
31110 271 LNGPOW COMPUTES THE DOUBLE PRECISION POWER OF A DOUBLE PRECISION NUMBER.
31131 5 COLCST MULTIPLIES A COLUMN VECTOR BY A CONSTANT.
31132 5 ROWCST MULTIPLIES A ROW VECTOR BY A CONSTANT.
31200 201 LNGINTADD COMPUTES THE SUM OF LONG NONNEGATIVE INTEGERS.
31201 201 LNGINTSUBTRACT COMPUTES THE DIFFERENCE OF LONG NONNEGATIVE INTEGERS.
31202 201 LNGINTMULT COMPUTES THE PRODUCT OF LONG NONNEGATIVE INTEGERS.
31203 201 LNGINTDIVIDE COMPUTES THE QUOTIENT WITH REMAINDER OF LONG NONNEGATIVE INTEGERS.
31204 201 LNGINTPOWER COMPUTES U**POWER, WHERE U IS A LONG NONNEGATIVE INTEGER AND POWER IS THE POSITIVE (SINGLE-LENGTH) EXPONENT.
31241 245 TAYPOL EVALUATES THE FIRST K TERMS OF A TAYLOR SERIES.
31242 245 NORDERPOL EVALUATES THE FIRST K NORMALIZED DERIVATIVES OF A POLYNOMIAL (I.E. J-TH DERIVATIVE/(J FACTORIAL)), J=0,1,...,K <= DEGREE.
31243 245 DERPOL EVALUATES THE FIRST K DERIVATIVES OF A POLYNOMIAL.
31248 205 INTCHS COMPUTES THE INDEFINITE INTEGRAL OF A GIVEN CHEBYSHEV SERIES.
31362 211 ALLZERORTPOL CALCULATES ALL ZEROS OF AN ORTHOGONAL POLYNOMIAL.
31363 211 UPZERORTPOL CALCULATES A NUMBER OF ADJACENT UPPER OR LOWER ZEROS OF AN ORTHOGONAL POLYNOMIAL.
31364 211 SELZERORTPOL CALCULATES A NUMBER OF ADJACENT ZEROS OF AN ORTHOGONAL POLYNOMIAL.
31425 291 GSSJACWGHTS COMPUTES THE ABSCISSAE AND WEIGHTS FOR GAUSS- JACOBI QUADRATURE.
31427 291 GSSLAGWGHTS COMPUTES THE ABSCISSAE AND WEIGHTS FOR GAUSS- LAGRANGE QUADRATURE.
31500 15 FULMATVEC CALCULATES THE PRODUCT A * B, WHERE A IS A GIVEN MATRIX AND B IS A VECTOR.
31501 15 FULTAMVEC CALCULATES THE PRODUCT A' * B, WHERE A' IS THE TRANSPOSED OF THE MATRIX A AND B IS A VECTOR.
31502 15 FULSYMMATVEC CALCULATES THE PRODUCT A * B, WHERE A IS A SYMMETRIC MATRIX, WHOSE UPPERTRIANGLE IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY AND B IS A VECTOR.
31503 15 RESVEC CALCULATES THE RESIDUAL VECTOR A * B + X * C, WHERE A IS A GIVEN MATRIX, B AND C ARE VECTORS AND X IS A SCALAR.
31504 15 SYMRESVEC CALCULATES THE RESIDUAL VECTOR A * B + X * C, WHERE A IS A SYMMETRIC MATRIX, WHOSE UPPERTRIANGLE IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY, B AND C ARE VECTORS AND X IS A SCALAR.
31505 285 LNGFULMATVEC CALCULATES BY DOUBLE PRECISION ARITHMETIC THE PRODUCT A * B, WHERE A IS A GIVEN MATRIX AND B IS A VECTOR.
31506 285 LNGFULTAMVEC CALCULATES BY DOUBLE PRECISION ARITHMETIC THE PRODUCT A' * B, WHERE A' IS THE TRANSPOSED OF THE MATRIX A AND B IS A VECTOR.
31507 285 LNGFULSYMMATVEC CALCULATES BY DOUBLE PRECISION ARITHMETIC THE PRODUCT A * B, WHERE A IS A SYMMETRIC MATRIX, WHOSE UPPERTRIANGLE IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY AND B IS A VECTOR.
31508 285 LNGRESVEC CALCULATES BY DOUBLE PRECISION ARITHMETIC THE RESIDUAL VECTOR A * B + X * C, WHERE A IS A GIVEN MATRIX, B AND C ARE VECTORS AND X IS A SCALAR.
31509 285 LNGSYMRESVEC CALCULATES BY DOUBLE PRECISION ARITHMETIC THE RESIDUAL VECTOR A * B + X * C, WHERE A IS A SYMMETRIC MATRIX, WHOSE UPPERTRIANGLE IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY, B AND C ARE VECTORS AND X IS A SCALAR.
32010 131 EULER PERFORMS THE SUMMATION OF AN ALTERNATING INFINITE SERIES.
32020 131 SUMPOSSERIES PERFORMS THE SUMMATION OF A INFINITE SERIES WITH POSITIVE MONOTONICALLY DECREASING TERMS USING THE VAN WIJNGAARDEN TRANSFORMATION.
32051 135 INTEGRAL CALCULATES THE DEFINITE INTEGRAL OF A FUNCTION OF ONE VARIABLE OVER A FINITE OR INFINITE INTERVAL OR OVER A NUMBER OF CONSECUTIVE INTERVALS.

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32070 133 QADRAT COMPUTES THE DEFINITE INTEGRAL OF A FUNCTION OF ONE VARIABLE OVER A FINITE INTERVAL.
32075 257 TRICUB COMPUTES THE DEFINITE INTEGRAL OF A FUNCTION OF TWO VARIABLES OVER A TRIANGULAR DOMAIN.
33010 141 RK1 SOLVES A SINGLE 1ST ORDER DIFFERENTIAL EQUATION BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD.
33012 171 RK2 INTEGRATES A SINGLE 2ND ORDER DIFFERENTIAL EQUATION (INITIAL VALUE PROBLEM) BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD.
33013 173 RK2N SOLVES A SYSTEM OF 2ND ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD.
33014 175 RK3 SOLVES A SINGLE 2ND ORDER DIFFERENTIAL EQUATION (INITIAL VALUE PROBLEM) BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD; THIS METHOD CAN ONLY BE USED IF THE RIGHT HAND SIDE OF THE DIFFERENTIAL EQUATION DOES NOT DEPEND ON Y'.
33015 177 RK3N SOLVES A SYSTEM OF 2ND ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD; THIS METHOD CAN ONLY BE USED IF THE RIGHT HAND SIDE OF THE DIFFERENTIAL EQUATIONS DOES NOT DEPEND ON Y'.
33016 145 RK4A SOLVES A SINGLE 1ST ORDER DIFFERENTIAL EQUATION BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD; THE INTEGRATION IS TERMINATED AS SOON AS A CONDITION ON X AND Y, WHICH IS SUPPLIED BY THE USER, IS SATISFIED.
33017 147 RK4NA SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD; THE INTEGRATION IS TERMINATED AS SOON AS A CONDITION ON X[0],...,X[N] , SUPPLIED BY THE USER, IS SATISFIED.
33018 149 RK5NA SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD; THE ARC LENGTH IS INTRODUCED AS AN INTEGRATION VARIABLE; THE INTEGRATION IS TERMINATED AS SOON AS A CONDITION ON X[0],...,X[N] , SUPPLIED BY THE USER, IS SATISFIED.
33033 143 RKE SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 5TH ORDER RUNGE-KUTTA METHOD.
33040 167 MODIFIED TAYLOR SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 1ST, 2ND OR 3RD ORDER ONE-STEP TAYLOR METHOD; THIS METHOD CAN BE USED TO SOLVE LARGE AND SPARSE SYSTEMS, PROVIDED HIGHER ORDER DERIVATIVES CAN EASILY BE OBTAINED.
33050 169 EXPONENTIALLY FITTED TAYLOR SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A VARIABLE ORDER TAYLOR METHOD; THIS METHOD CAN BE USED TO SOLVE STIFF SYSTEMS, WITH KNOWN EIGEN VALUE SPECTRUM, PROVIDED HIGHER ORDER DERIVATIVES CAN EASILY BE OBTAINED.
33061 155 ARK SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A STABILIZED RUNGE-KUTTA METHOD WITH LIMITED STORAGE REQUIREMENTS.
33066 295 ARKMAT SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL BOUNDARY-VALUE PROBLEM) BY MEANS OF A STABILIZED RUNGE-KUTTA METHOD, IN PARTICULAR SUITABLE FOR SYSTEMS ARISING FROM TWO-DIMENSIONAL TIME-DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS.
33070 157 EFRK SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 1ST, 2ND OR 3RD ORDER, EXPONENTIONALLY FITTED RUNGE-KUTTA METHOD; AUTOMATIC STEPSIZE CONTROL IS NOT PROVIDED; THIS METHOD CAN BE USED TO SOLVE STIFF SYSTEMS WITH KNOWN EIGENVALUE SPECTRUM.
33080 151 MULTISTEP SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A VARIABLE ORDER MULTISTEP METHOD ADAMS-MOULTON, ADAMS-BASHFORTH OR GEAR'S METHOD; THE ORDER OF ACCURACY IS AUTOMATIC, UP TO 5TH ORDER; THIS METHOD IS SUITABLE FOR STIFF SYSTEMS.
33120 161 EFERK SOLVES AN AUTONOMOUS SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF AN EXPONENTIALLY FITTED, 3RD ORDER RUNGE-KUTTA METHOD; THIS METHOD CAN BE USED TO SOLVE STIFF SYSTEMS WITH KNOWN EIGENVALUE SPECTRUM.
33131 165 LINIGER2 SOLVES AN AUTONOMOUS SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF AN IMPLICIT, EXPONENTIALLY FITTED 1ST ORDER ONE-STEP METHOD; AUTOMATIC STEP-SIZE CONTROL IS NOT PROVIDED; THIS METHOD CAN BE USED TO SOLVE STIFF SYSTEMS.
33132 221 LINIGER1VS SOLVES AN AUTONOMOUS SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF AN IMPLICIT, EXPONENTIALLY FITTED 1ST ORDER ONE-STEP METHOD;THIS METHOD CAN BE USED TO SOLVE STIFF SYSTEMS.
33135 231 IMPEX SOLVES AN AUTONOMOUS SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF THE IMPLICIT MIDPOINT RULE WITH SMOOTHING AND EXTRAPOLATION; THIS METHOD IS SUITABLE FOR THE INTEGRATION OF STIFF DIFFERENTIAL EQUATIONS.
33160 159 EFSIRK SOLVES AN AUTONOMOUS SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 3RD ORDER, EXPONENTIALLY FITTED, SEMI-IMPLICIT RUNGE-KUTTA METHOD; THIS METHOD CAN BE USED TO SOLVE STIFF SYSTEMS.
33170 225 RICHARDSON SOLVES A SYSTEM OF LINEAR EQUATIONS WITH POSITIVE REAL EIGENVALUES (ELLIPTIC BOUNDARY VALUE PROBLEM) BY MEANS OF A NON-STATIONARY 2ND ORDER ITERATIVE METHOD.
33171 225 ELIMINATION SOLVES A SYSTEM OF LINEAR EQUATIONS WITH POSITIVE REAL EIGENVALUES (ELLIPTIC BOUNDARY VALUE PROBLEM) BY MEANS OF A NON-STATIONARY 2ND ORDER ITERATIVE METHOD, WHICH IS AN ACCELERATION OF RICHARDSON'S METHOD.
33180 153 DIFFSYS SOLVES A SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM); BY EXTRAPOLATION, APPLIED TO LOW ORDER RESULTS, A HIGH ORDER OF ACCURACY IS OBTAINED; THIS METHOD IS SUITABLE FOR SMOOTH PROBLEMS WHEN HIGH ACCURACY IS

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REQUIRED.
33191 223 GMS SOLVES AN AUTONOMOUS SYSTEM OF 1ST ORDER DIFFERENTIAL EQUATIONS (INITIAL VALUE PROBLEM) BY MEANS OF A 3RD ORDER MULTISTEP METHOD; THIS METHOD CAN BE USED TO SOLVE STIFF SYSTEMS.
33300 261 FEMLAGSYM SOLVES A LINEAR TWO-POINT BOUNDARY-VALUE PROBLEM FOR A SECOND ORDER SELF-ADJOINT DIFFERENTIAL EQUATION BY A RITZ-GALERKIN METHOD.
33301 261 FEMLAG SOLVES A LINEAR TWO-POINT BOUNDARY-VALUE PROBLEM FOR A SECOND ORDER SELF-ADJOINT DIFFERENTIAL EQUATION BY A RITZ-GALERKIN METHOD; THE COEFFICIENT OF Y" IS SUPPOSED TO BE UNITY.
33302 263 FEMLAGSKEW SOLVES A LINEAR TWO-POINT BOUNDARY-VALUE PROBLEM FOR A SECOND ORDER DIFFERENTIAL EQUATION BY A RITZ-GALERKIN METHOD.
33303 265 FEMHERMSYM SOLVES A LINEAR TWO-POINT BOUNDARY-VALUE PROBLEM FOR A FOURTH ORDER SELF-ADJOINT DIFFERENTIAL EQUATION WITH DIRICHLET BOUNDARY CONDITIONS BY A RITZ-GALERKIN METHOD.
34010 7 VECVEC := SCALAR PRODUCT OF A VECTOR AND A VECTOR.
34011 7 MATVEC := SCALAR PRODUCT OF A ROW VECTOR AND A VECTOR.
34012 7 TAMVEC := SCALAR PRODUCT OF A COLUMN VECTOR AND A VECTOR.
34013 7 MATMAT := SCALAR PRODUCT OF A ROW VECTOR AND A COLUMN VECTOR.
34014 7 TAMMAT := SCALAR PRODUCT OF A COLUMN VECTOR AND A COLUMN VECTOR.
34015 7 MATTAM := SCALAR PRODUCT OF A ROW VECTOR AND A ROW VECTOR.
34016 7 SEQVEC := SCALAR PRODUCT OF TWO VECTORS GIVEN IN ONE-DIMENSIONAL ARRAYS, WHERE THE MUTUAL SPACINGS BETWEEN THE INDICES OF THE 1ST VECTOR CHANGE LINEARLY.
34017 7 SCAPRD1 := SCALAR PRODUCT OF TWO VECTORS GIVEN IN ONE-DIMENSIONAL ARRAYS, WHERE THE SPACINGS OF BOTH VECTORS ARE CONSTANT.
34018 7 SYMMATVEC := SCALAR PRODUCT OF A VECTOR AND A ROW OF A SYMMETRIC MATRIX, WHOSE UPPERTRIANGLE IS GIVEN COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
34020 9 ELMVEC ADDS A CONSTANT TIMES A VECTOR TO A VECTOR.
34021 9 ELMVECCOL ADDS A CONSTANT TIMES A COLUMN VECTOR TO A VECTOR.
34022 9 ELMCOLVEC ADDS A CONSTANT TIMES A VECTOR TO A COLUMN VECTOR.
34023 9 ELMCOL ADDS A CONSTANT TIMES A COLUMN VECTOR TO A COLUMN VECTOR.
34024 9 ELMROW ADDS A CONSTANT TIMES A ROW VECTOR TO A ROW VECTOR.
34025 9 MAXELMROW ADDS A CONSTANT TIMES A ROW VECTOR TO A ROW VECTOR, MAXELMROW:=THE SUBSCRIPT OF AN ELEMENT OF THE NEW ROW VECTOR WHICH IS OF MAXIMUM ABSOLUTE VALUE.
34026 9 ELMVECROW ADDS A CONSTANT TIMES A ROW VECTOR TO A VECTOR.
34027 9 ELMROWVEC ADDS A CONSTANT TIMES A VECTOR TO A ROW VECTOR.
34028 9 ELMROWCOL ADDS A CONSTANT TIMES A COLUMN VECTOR TO A ROW VECTOR.
34029 9 ELMCOLROW ADDS A CONSTANT TIMES A ROW VECTOR TO A COLUMN VECTOR.
34030 11 ICHVEC INTERCHANGES TWO VECTORS GIVEN IN ARRAY A[L:U] AND ARRAY A[SHIFT + L : SHIFT + U].
34031 11 ICHCOL INTERCHANGES TWO COLUMNS OF A MATRIX.
34032 11 ICHROW INTERCHANGES TWO ROWS OF MATRIX.
34033 11 ICHROWCOL INTERCHANGES A ROW AND A COLUMN OF A MATRIX.
34034 11 ICHSEQVEC INTERCHANGES A ROW AND A COLUMN OF AN UPPERTRIANGULAR MATRIX, WHICH IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
34035 11 ICHSEQ INTERCHANGES TWO COLUMNS OF AN UPPERTRIANGULAR MATRIX, WHICH IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
34040 13 ROTCOL REPLACES TWO COLUMN VECTORS X AND Y BY TWO VECTORS CX + SY AND CY - SX.
34041 13 ROTROW REPLACES TWO ROW VECTORS X AND Y BY TWO VECTORS CX + SY AND CY - SX.
34051 49 SOL SOLVES THE SYSTEM OF LINEAR EQUATIONS WHOSE MATRIX HAS BEEN TRIANGULARLY DECOMPOSED BY DEC.
34053 51 INV CALCULATES THE INVERSE OF A MATRIX THAT HAS BEEN TRIANGULARLY DECOMPOSED BY DEC.
34061 49 SOLELM SOLVES A SYSTEM OF LINEAR EQUATIONS WHOSE MATRIX HAS BEEN TRIANGULARLY DECOMPOSED BY GSSELM OR GSSERB.
34071 79 SOLBND SOLVES A SYSTEM OF LINEAR EQUATIONS, THE MATRIX BEING DECOMPOSED BY DECBND.
34131 65 LSQSOL SOLVES A LINEAR LEAST SQUARES PROBLEM IF THE COEFFICIENT MATRIX HAS BEEN DECOMPOSED BY LSQORTDEC.
34132 63 LSQDGLINV CALCULATES THE DIAGONAL ELEMENTS OF THE INVERSE OF M'M, WHERE M IS THE COEFFICIENT MATRIX OF A LINEAR LEAST SQUARES PROBLEM.
34134 63 LSQORTDEC DELIVERS THE HOUSEHOLDER TRIANGULARIZATION WITH COLUMN INTERCHANGES OF THE MATRIX OF A LINEAR LEAST SQUARES PROBLEM.
34135 65 LSQORTDECSOL SOLVES A LINEAR LEAST SQUARES PROBLEM BY HOUSEHOLDER TRIANGULARIZATION WITH COLUMN INTERCHANGES AND CALCULATES THE DIAGONAL OF THE INVERSE OF M'M, WHERE M IS THE COEFFICIENT MATRIX.
34136 207 LSQINV CALCULATES THE INVERSE OF THE MATRIX S'S, WHERE S IS THE COEFFICIENT MATRIX OF A LINEAR LEAST SQUARES PROBLEM.
34140 101 TFMSYMTRI2 TRANSFORMS A REAL SYMMETRIC MATRIX INTO A SIMILAR TRIDIAGONAL ONE BY MEANS OF HOUSEHOLDER'S TRANSFORMATION.

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34141 101 BAKSYMTRI2 PERFORMS THE BACK TRANSFORMATION CORRESPONDING TO TFMSYMTRI2.
34142 101 TFMPREVEC IN COMBINATION WITH TFMSYMTRI2 CALCULATES THE TRANSFORMING MATRIX.
34143 101 TFMSYMTRI1 TRANSFORMS A REAL SYMMETRIC MATRIX INTO A SIMILAR TRIDIAGONAL ONE BY MEANS OF HOUSEHOLDER'S TRANSFORMATION.
34144 101 BAKSYMTRI1 PERFORMS THE BACK TRANSFORMATION CORRESPONDING TO TFMSYMTRI1.
34150 215 ZEROIN FINDS (IN A GIVEN INTERVAL) A ZERO OF A FUNCTION OF ONE VARIABLE.
34151 111 VALSYMTRI CALCULATES ALL, OR SOME CONSECUTIVE, EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX BY MEANS OF LINEAR INTERPOLATION USING A STURM SEQUENCE.
34152 111 VECSYMTRI CALCULATES EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX BY MEANS OF INVERSE ITERATION.
34153 113 EIGVALSYM2 CALCULATES ALL (OR SOME) EIGENVALUES OF A SYMMETRIC MATRIX USING LINEAR INTERPOLATION OF A FUNCTION DERIVED FROM A STURM SEQUENCE.
34154 113 EIGSYM2 CALCULATES EIGENVALUES AND EIGENVECTORS BY MEANS OF INVERSE ITERATION.
34155 113 EIGVALSYM1 CALCULATES ALL (OR SOME) EIGENVALUES OF A SYMMETRIC MATRIX USING LINEAR INTERPOLATION OF A FUNCTION DERIVED FROM A STURM SEQUENCE.
34156 113 EIGSYM1 CALCULATES EIGENVALUES AND EIGENVECTORS BY MEANS OF INVERSE ITERATION.
34160 111 QRIVALSYMTRI CALCULATES THE EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX BY MEANS OF QR ITERATION.
34161 111 QRISYMTRI CALCULATES THE EIGENVALUES AND EIGENVECTORS OF A SYMMETRIC TRIDIAGONAL MATRIX BY MEANS OF QR ITERATION.
34162 113 QRIVALSYM2 CALCULATES THE EIGENVALUES OF A SYMMETRIC MATRIX BY MEANS OF QR ITERATION.
34163 113 QRISYM CALCULATES ALL EIGENVALUES AND EIGENVECTORS OF A SYMMETRIC MATRIX BY MEANS OF QR ITERATION.
34164 113 QRIVALSYM1 CALCULATES THE EIGENVALUES OF A SYMMETRIC MATRIX BY MEANS OF QR ITERATION.
34170 103 TFMREAHES TRANSFORMS A MATRIX INTO A SIMILAR UPPER-HESSENBERG MATRIX BY MEANS OF WILKINSON'S TRANSFORMATION.
34171 103 BAKREAHES1 PERFORMS THE BACK TRANSFORMATION (ON A VECTOR) CORRESPONDING TO TFMREAHES.
34172 103 BAKREAHES2 PERFORMS THE BACK TRANSFORMATION (ON COLUMNS) CORRESPONDING TO TFMREAHES.
34173 97 EQILBR EQUILIBRATES A MATRIX BY MEANS OF A DIAGONAL SIMILARITY TRANSFORMATION.
34174 97 BAKLBR PERFORMS THE BACK TRANSFORMATION CORRESPONDING TO EQILBR.
34180 115 REAVALQRI CALCULATES THE EIGENVALUES OF A REAL UPPER-HESSENBERG MATRIX, PROVIDED THAT ALL EIGENVALUES ARE REAL, BY MEANS OF SINGLE QR ITERATION.
34181 115 REAVECHES CALCULATES AN EIGENVECTOR CORRESPONDING TO A GIVEN REAL EIGENVALUE OF A REAL UPPER-HESSENBERG MATRIX BY MEANS OF INVERSE ITERATION.
34182 117 REAEIGVAL CALCULATES THE EIGENVALUES OF A MATRIX, PROVIDED THAT ALL EIGENVALUES ARE REAL.
34183 17 REASCL NORMALIZES THE COLUMNS OF A TWO-DIMENSIONAL ARRAY.
34184 117 REAEIG1 CALCULATES THE EIGENVECTORS AND EIGENVALUES OF A MATRIX, PROVIDED THAT THEY ARE ALL REAL.
34186 115 REAQRI CALCULATES ALL EIGENVALUES AND EIGENVECTORS OF A REAL UPPER-HESSENBERG MATRIX, PROVIDED THAT ALL EIGENVALUES ARE REAL, BY MEANS OF SINGLE QR ITERATION.
34187 117 REAEIG3 CALCULATES THE EIGENVECTORS AND EIGENVALUES OF A MATRIX, PROVIDED THAT THEY ARE ALL REAL.
34190 115 COMVALQRI CALCULATES THE REAL AND COMPLEX EIGENVALUES OF A REAL UPPER-HESSENBERG MATRIX BY MEANS OF DOUBLE QR ITERATION.
34191 115 COMVECHES CALCULATES THE EIGENVECTOR CORRESPONDING TO A GIVEN COMPLEX EIGENVALUE OF A REAL UPPER-HESSENBERG MATRIX BY MEANS OF INVERSE ITERATION.
34192 117 COMEIGVAL CALCULATES THE EIGENVALUES OF A MATRIX.
34193 29 COMSCL NORMALIZES REAL AND COMPLEX EIGENVECTORS.
34194 117 COMEIG1 CALCULATES THE EIGENVALUES AND EIGENVECTORS OF A MATRIX.
34210 139 LINEMIN MINIMIZES A FUNCTION OF SEVERAL VARIABLES IN A GIVEN DIRECTION.
34211 139 RNK1UPD ADDS A RANK-1 MATRIX TO A SYMMETRIC MATRIX.
34212 139 DAVUPD ADDS A RANK-2 MATRIX TO A SYMMETRIC MATRIX.
34213 139 FLEUPD ADDS A RANK-2 MATRIX TO A SYMMETRIC MATRIX.
34214 19 RNK1MIN MINIMIZES A FUNCTION OF SEVERAL VARIABLES.
34215 19 FLEMIN MINIMIZES A FUNCTION OF SEVERAL VARIABLES.
34220 95 CONJ GRAD SOLVES A POSITIVE DEFINITE SYMMETRIC SYSTEM OF LINEAR EQUATIONS BY THE METHOD OF CONJUGATE GRADIENTS.
34231 45 GSSELM PERFORMS A TRIANGULAR DECOMPOSITION WITH A COMBINATION OF PARTIAL AND COMPLETE PIVOTING.
34232 49 GSSSOL SOLVES A SYSTEM OF LINEAR EQUATIONS.
34235 51 INV1 CALCULATES THE INVERSE OF A MATRIX THAT HAS BEEN TRIANGULARLY DECOMPOSED BY GSSELM OR GSSERB.THE 1-NORM OF THE INVERSE MATRIX MIGHT ALSO BE CALCULATED.
34236 51 GSSINV CALCULATES THE INVERSE OF A MATRIX.
34240 45 ONENRMINV CALCULATES THE 1-NORM OF THE INVERSE OF A MATRIX WHOSE TRIANGULARLY DECOMPOSED FORM IS DELIVERED BY GSSELM.
34241 45 ERBELM CALCULATES A ROUGH UPPERBOUND FOR THE ERROR IN THE SOLUTION OF A SYSTEM OF LINEAR EQUATIONS WHOSE MATRIX IS TRIANGULARLY DECOMPOSED BY GSSELM.

34242 45 GSSERB PERFORMS A TRIANGULAR DECOMPOSTION OF THE MATRIX OF A SYSTEM OF LINEAR EQUATIONS AND CALCULATES AN UPPERBOUND FOR THE RELATIVE ERROR IN THE SOLUTION OF THAT SYSTEM.
34243 49 GSSSOLERB SOLVES A SYSTEM OF LINEAR EQUATIONS AND CALCULATES A ROUGH UPPERBOUND FOR THE RELATIVE ERROR IN THE CALCULATED SOLUTION.
34244 51 GSSINVERB CALCULATES THE INVERSE OF A MATRIX AND 1-NORM, AN UPPERBOUND FOR THE ERROR IN THE INVERSE MATRIX IS ALSO GIVEN.
34250 53 ITISOL SOLVES A SYSTEM OF LINEAR EQUATIONS WHOSE MATRIX HAS BEEN TRIANGULARLY DECOMPOSED BY GSSELM OR GSSERB. THIS SOLUTION IS IMPROVED ITERATIVELY.
34251 53 GSSITISOL SOLVES A SYSTEM OF LINEAR EQUATIONS AND THE SOLUTION IS IMPROVED ITERATIVELY.
34252 45 GSSNRI PERFORMS A TRIANGULAR DECOMPOSITION AND CALCULATES THE 1-NORM OF THE INVERSE MATRIX.
34253 53 ITISOLERB SOLVES A SYSTEM OF LINEAR EQUATIONS WHOSE MATRIX HAS TRIANGULARLY DECOMPOSED BY GSSNRI; THIS SOLUTION IS IMPROVED ITERATIVELY AN UPPERBOUND FOR THE ERROR IN THE SOLUTION IS CALCULATED.
34254 53 GSSITISOLERB SOLVES A SYSTEM OF LINEAR EQUATIONS; THIS SOLUTION IS IMPROVED ITERATIVELY AND AN UPPERBOUND FOR THE ERROR IN THE SOLUTION IS CALCULATED.
34260 109 HSHREABID TRANSFORMS A MATRIX TO BIDIAGONAL FORM, BY PREMULTIPLYING AND POSTMULTIPLYING WITH ORTHOGONAL MATRICES.
34261 109 POSTFNMAT CALCULATES THE POSTMULTIPLYING MATRIX FROM THE DATA GENERATED BY HSHREABID.
34262 109 PRETFNMAT CALCULATES THE PREMULTIPLYING MATRIX FROM THE DATA GENERATED BY HSHREABID.
34270 125 ORISNGVALBID CALCULATES THE SINGULAR VALUES OF A BIDIAGONAL MATRIX.
34271 125 ORISNGVALDECBID CALCULATES THE SINGULAR VALUES DECOMPOSITION OF A MATRIX OF WHICH THE BIDIAGONAL AND THE PRE- AND POSTMULTIPLYING MATRICES ARE GIVEN.
34272 127 ORISNGVAL CALCULATES THE SINGULAR VALUES OF A GIVEN MATRIX.
34273 127 ORISNGVALDEC CALCULATES THE SINGULAR VALUES DECOMPOSITION U * S * V', WITH U AND V ORTHOGONAL AND S POSITIVE DIAGONAL.
34280 67 SOLSVDOVR SOLVES AN OVERDETERMINED SYSTEM OF LINEAR EQUATIONS, MULTIPLYING THE RIGHT-HAND SIDE BY THE PSEUDO-INVERSE OF THE GIVEN MATRIX.
34281 67 SOLOVR CALCULATES THE SINGULAR VALUES DECOMPOSITION AND SOLVES AN OVERDETERMINED SYSTEM OF LINEAR EQUATIONS.
34282 69 SOLSVDUND SOLVES AN UNDERDETERMINED SYSTEM OF LINEAR EQUATIONS, MULTIPLYING THE RIGHT-HAND SIDE BY THE PSEUDO-INVERSE OF THE GIVEN MATRIX.
34283 69 SOLUND CALCULATES THE SINGULAR VALUES DECOMPOSITION AND SOLVES AN UNDERDETERMINED SYSTEM OF LINEAR EQUATIONS.
34284 71 HOMSOLSVD SOLVES THE HOMOGENEOUS SYSTEM OF LINEAR EQUATIONS A * X = 0 AND X' * A = 0, WHERE "A" DENOTES A MATRIX AND "X" A VECTOR; (THE SINGULAR VALUE DECOMPOSITION BEING GIVEN).
34285 71 HOMSOL SOLVES THE HOMOGENEOUS SYSTEM OF LINEAR EQUATIONS OF EQUATIONS A * X = 0 AND X' * A = 0, WHERE "A" DENOTES A MATRIX AND "X" A VECTOR.
34286 73 PSDINVSVD CALCULATES THE PSEUDO-INVERSE OF A MATRIX; (THE SINGULAR VALUE DECOMPOSITION BEING GIVEN).
34287 73 PSDINV CALCULATES THE PSEUDO-INVERSE OF A MATRIX.
34300 45 DEC PERFORMS A TRIANGULAR DECOMPOSITION WITH PARTIAL PIVOTING.
34301 49 DECSOL SOLVES A SYSTEM OF LINEAR EQUATIONS WHOSE ORDER IS SMALL RELATIVE TO THE NUMBER OF BINARY DIGITS IN THE NUMBER REPRESENTATION.
34302 51 DECINV CALCULATES THE INVERSE OF A MATRIX WHOSE ORDER IS SMALL RELATIVE TO THE NUMBER OF BINARY DIGITS IN THE NUMBER REPRESENTATION.
34303 47 DETERM CALCULATES THE DETERMINANT OF A TRIANGULARLY DECOMPOSED MATRIX.
34310 55 CHLDEC2 CALCULATES THE CHOLESKY DECOMPOSITION OF A POSITIVE DEFINITE SYMMETRIC MATRIX WHOSE UPPER TRIANGLE IS GIVEN IN A TWO-DIMENSIONAL ARRAY.
34311 55 CHLDEC1 CALCULATES THE CHOLESKY DECOMPOSITION OF A POSITIVE DEFINITE SYMMETRIC MATRIX WHOSE UPPER TRIANGLE IS GIVEN COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
34312 57 CHLDETERM2 CALCULATES OF THE DETERMINANT OF A POSITIVE DEFINITE SYMMETRIC MATRIX, THE CHOLESKY DECOMPOSITION BEING GIVEN IN A TWO-DIMENSIONAL ARRAY.
34313 57 CHLDETERM1 CALCULATES THE DETERMINANT OF A POSITIVE DEFINITE SYMMETRIC MATRIX, THE CHOLESKY DECOMPOSITION BEING GIVEN COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
34320 75 DECBND PERFORMS A TRIANGULAR DECOMPOSITION OF A BAND MATRIX, USING PARTIAL PIVOTING.
34321 77 DETERMBND CALCULATES THE DETERMINANT OF A BAND MATRIX.
34322 79 DECSOLBND SOLVES A SYSTEM OF LINEAR EQUATIONS BY GAUSSIAN ELIMINATION WITH PARTIAL PIVOTING IF THE COEFFICIENT MATRIX IS IN BAND FORM AND IS STORED ROWWISE IN A ONE-DIMENSIONAL ARRAY.
34330 85 CHLDECBND PERFORMS THE CHOLESKY DECOMPOSITION OF A POSITIVE DEFINITE SYMMETRIC BAND MATRIX.
34331 87 CHLDETERMBND CALCULATES THE DETERMINANT OF A POSITIVE DEFINITE SYMMETRIC BAND MATRIX.
34332 89 CHLSOLBND SOLVES A POSITIVE DEFINITE SYMMETRIC LINEAR SYSTEM, THE TRIANGULAR DECOMPOSITION BEING GIVEN.
34333 89 CHLDECSOLBND SOLVES A POSITIVE DEFINITE SYMMETRIC LINEAR SYSTEM AND PERFORMS THE TRIANGULAR DECOMPOSITION BY CHOLESKY'S

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METHOD.
34340 35 COMABS CALCULATES THE MODULUS OF A COMPLEX NUMBER.
34341 37 COMMUL CALCULATES THE PRODUCT OF TWO COMPLEX NUMBERS.
34342 37 COMDIV CALCULATES THE QUOTIENT OF TWO COMPLEX NUMBERS.
34343 35 COMSQRT CALCULATES THE SQUARE ROOT OF A COMPLEX NUMBER.
34344 35 CARPOL TRANSFORMS THE CARTESIAN COORDINATES OF A COMPLEX NUMBER INTO POLAR COORDINATES.
34345 129 COMKWD CALCULATES THE ROOTS OF A QUADRATIC EQUATION WITH COMPLEX COEFFICIENTS.
34352 21 COMCOLCST MULTIPLIES A COMPLEX COLUMN VECTOR BY A COMPLEX NUMBER.
34353 21 COMROWCST MULTIPLIES A COMPLEX ROW VECTOR BY A COMPLEX NUMBER.
34354 23 COMMATVEC CALCULATES THE SCALAR PRODUCT OF A COMPLEX ROW VECTOR AND A COMPLEX VECTOR.
34355 23 HSHCOMCOL TRANSFORMS A COMPLEX VECTOR INTO A VECTOR PROPORTIONAL TO A UNIT VECTOR.
34356 23 HSHCOMPRD PREMULTIPLIES A COMPLEX MATRIX WITH A COMPLEX HOUSEHOLDER MATRIX.
34357 287 ROTCOMCOL REPLACES TWO COMPLEX COLUMN VECTORS X AND Y BY TWO COMPLEX VECTORS CX + SY AND CY - SX.
34358 287 ROTCOMROW REPLACES TWO COMPLEX ROW VECTORS X AND Y BY TWO COMPLEX VECTORS CX + SY AND CY - SX.
34359 31 COMEUCNRM CALCULATES THE EUCLIDEAN NORM OF A COMPLEX MATRIX WITH LW LOWER CODIAGONALS.
34360 29 SCLCOM NORMALIZES THE COLUMNS OF A COMPLEX MATRIX.
34361 99 EQILBRCOM EQUILIBRATES A COMPLEX MATRIX.
34362 99 BAKLBRCOM TRANSFORMS THE EIGENVECTORS OF A COMPLEX EQUILIBRATED (BY EQILBRCOM) MATRIX INTO THE EIGENVECTORS OF THE ORIGINAL MATRIX.
34363 105 HSHHRMTRI TRANSFORMS A HERMITIAN MATRIX INTO A SIMILAR REAL SYMMETRIC TRIDIAGONAL MATRIX.
34364 105 HSHHRMTRIVAL DELIVERS THE MAIN DIAGONAL ELEMENTS AND THE SQUARES OF THE CODIAGONAL ELEMENTS OF A HERMITIAN TRIDIAGONAL MATRIX WHICH IS UNITARY SIMILAR WITH A GIVEN HERMITIAN MATRIX.
34365 105 BAKHRMTRI PERFORMS THE BACK TRANSFORMATION CORRESPONDING TO HSHHRMTRI.
34366 107 HSHCOMHES TRANSFORMS A COMPLEX MATRIX BY MEANS OF HOUSEHOLDER'S TRANSFORMATION FOLLOWED BY A COMPLEX DIAGONAL TRANSFORMATION INTO A SIMILAR UNITARY UPPER-HESSENBERG MATRIX WITH A REAL NONNEGATIVE SUBDIAGONAL.
34367 107 BAKCOMHES PERFORMS THE BACK TRANSFORMATION CORRESPONDING TO HSHCOMHES.
34368 119 EIGVALHRM CALCULATES THE EIGENVALUES OF A COMPLEX HERMITIAN MATRIX.
34369 119 EIGHRM CALCULATES THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX HERMITIAN MATRIX.
34370 119 QRIVALHRM CALCULATES THE EIGENVALUES OF A COMPLEX HERMITIAN MATRIX.
34371 119 QRIHRM CALCULATES THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX HERMITIAN MATRIX.
34372 121 VALQRICOM CALCULATES THE EIGENVALUES OF A COMPLEX UPPER-HESSENBERG MATRIX WITH A REAL SUBDIAGONAL.
34373 121 QRICOM CALCULATES THE EIGENVECTORS AND THE EIGENVALUES OF A COMPLEX UPPER-HESSENBERG MATRIX.
34374 123 EIGVALCOM CALCULATES THE EIGENVALUES OF A COMPLEX MATRIX.
34375 123 EIGCOM CALCULATES THE EIGENVECTORS AND EIGENVALUES OF A COMPLEX MATRIX.
34376 25 ELMCOMVECCOL ADDS A COMPLEX NUMBER TIMES A COMPLEX COLUMN VECTOR TO A COMPLEX VECTOR.
34377 25 ELMCOMCOL ADDS A COMPLEX NUMBER TIMES A COMPLEX COLUMN VECTOR TO A COMPLEX COLUMN VECTOR.
34378 25 ELMCOMROWVEC ADDS A COMPLEX NUMBER TIMES A COMPLEX VECTOR TO A COMPLEX ROW VECTOR.
34390 59 CHLSOL2 SOLVES A SYSTEM OF LINEAR EQUATIONS IF THE COEFFICIENT MATRIX HAS BEEN DECOMPOSED BY CHLDEC2 OR CHLDECSOL2.
34391 59 CHLSOL1 SOLVES A SYSTEM OF LINEAR EQUATIONS IF THE COEFFICIENT MATRIX HAS BEEN DECOMPOSED BY CHLDEC1 OR CHLDECSOL1.
34392 59 CHLDECSOL2 SOLVES A POSITIVE DEFINITE SYMMETRIC SYSTEM OF LINEAR EQUATIONS BY CHOLESKY'S SQUARE ROOT METHOD; THE COEFFICIENT MATRIX SHOULD BE GIVEN IN THE UPPERTRIANGLE OF A TWO-DIMENSIONAL ARRAY.
34393 59 CHLDECSOL1 SOLVES A POSITIVE DEFINITE SYMMETRIC SYSTEM OF LINEAR EQUATIONS BY CHOLESKY'S SQUARE ROOT METHOD; THE COEFFICIENT MATRIX SHOULD BE GIVEN COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
34400 61 CHLINV2 CALCULATES THE INVERSE OF A POSITIVE DEFINITE SYMMETRIC MATRIX, IF THE MATRIX HAS BEEN DECOMPOSED BY CHLDEC2 OR CHLDECSOL2.
34401 61 CHLINV1 CALCULATES THE INVERSE OF A POSITIVE DEFINITE SYMMETRIC MATRIX, IF THE MATRIX HAS BEEN DECOMPOSED BY CHLDEC1 OR CHLDECSOL1.
34402 61 CHLDECINV2 CALCULATES THE INVERSE OF A POSITIVE DEFINITE SYMMETRIC MATRIX BY CHOLESKY'S SQUARE ROOT METHOD; THE COEFFICIENT MATRIX GIVEN COLUMNWISE IN A TWO-DIMENSIONAL ARRAY.
34403 61 CHLDECINV1 CALCULATES THE INVERSE OF A POSITIVE DEFINITE SYMMETRIC MATRIX BY CHOLESKY'S SQUARE ROOT METHOD; THE COEFFICIENT MATRIX GIVEN COLUMNWISE IN A ONE-DIMENSIONAL ARRAY.
34410 285 LNGVECVEC CALCULATES THE SCALAR PRODUCT OF TWO VECTORS BY DOUBLE LENTGH ARITHMETIC.
34411 285 LNGMATVEC CALCULATES THE SCALAR PRODUCT OF A VECTOR AND A ROW VECTOR BY DOUBLE PRECISION ARITHMETIC.
34412 285 LNGTAMVEC CALCULATES THE SCALAR PRODUCT OF A VECTOR AND A COLUMN VECTOR BY DOUBLE PRECISION ARITHMETIC.
34413 285 LNGMATMAT CALCULATES THE SCALAR PRODUCT OF A ROW OF A VECTOR AND A COLUMN VECTOR BY DOUBLE PRECISION ARITHMETIC.
34414 285 LNGTAMMAT CALCULATES THE SCALAR PRODUCT OF TWO COLUMN VECTORS BY DOUBLE PRECISION ARITHMETIC.

34415 285 LNGMATTAM CALCULATES THE SCALAR PRODUCT OF TWO ROW VECTORS BY DOUBLE PRECISION ARITHMETIC.
34416 285 LNGSEQVEC CALCULATES THE SCALAR PRODUCT OF TWO VECTORS GIVEN IN ONE-DIMENSIONAL ARRAYS, WHERE THE MUTUAL SPACINGS BETWEEN THE INDICES OF THE 1ST VECTOR CHANGE LINEARLY, BY DOUBLE LENGTH ARITHMETIC.
34417 285 LNGSCAPRD1 CALCULATES THE SCALAR PRODUCT OF TWO VECTORS GIVEN IN ONE-DIMENSIONAL ARRAYS, WHERE THE SPACINGS OF BOTH VECTORS ARE CONSTANT, BY DOUBLE PRECISION ARITHMETIC.
34418 285 LNGSYMMATVEC CALCULATES THE SCALAR PRODUCT OF A VECTOR GIVEN IN A ONE-DIMENSIONAL ARRAY AND A ROW OF A SYMMETRIC MATRIX, WHOSE UPPER TRIANGLE IS STORED COLUMNWISE IN A ONE-DIMENSIONAL ARRAY, BY DOUBLE PRECISION ARITHMETIC.
34420 91 DECSYMTRI PERFORMS THE TRIANGULAR DECOMPOSITION OF A SYMMETRIC TRIDIAGONAL MATRIX.
34421 93 SOLSYMTRI SOLVES A SYMMETRIC TRIDIAGONAL SYSTEM OF LINEAR EQUATIONS, THE TRIANGULAR DECOMPOSITION BEING GIVEN.
34422 93 DECSOLSYMTRI SOLVES A SYMMETRIC TRIDIAGONAL SYSTEM OF LINEAR EQUATIONS AND PERFORMS THE TRIDIAGONAL DECOMPOSITION.
34423 81 DECTRI PERFORMS A TRIANGULAR DECOMPOSITION OF A TRIDIAGONAL MATRIX.
34424 83 SOLTRI SOLVES A TRIDIAGONAL SYSTEM OF LINEAR EQUATIONS THE TRIANGULAR DECOMPOSITION BEING GIVEN.
34425 83 DECSOLTRI SOLVES A TRIDIAGONAL SYSTEM OF LINEAR EQUATIONS AND PERFORMS THE TRIANGULAR DECOMPOSITION WITHOUT PIVOTING.
34426 81 DECTRIPIV PERFORMS A TRIANGULAR DECOMPOSITION OF A TRIDIAGONAL MATRIX, USING PARTIAL PIVOTING.
34427 83 SOLTRIPIV SOLVES A TRIDIAGONAL SYSTEM OF LINEAR EQUATIONS THE TRIANGULAR DECOMPOSITION BEING GIVEN.
34428 83 DECSOLTRIPIV SOLVES A TRIDIAGONAL SYSTEM OF LINEAR EQUATIONS AND PERFORMS THE TRIANGULAR DECOMPOSITION WITH PARTIAL PIVOTING.
34430 217 QUANEWBND SOLVES A SYSTEM OF NON-LINEAR EQUATIONS OF WHICH THE JACOBIAN (BEING A BAND MATRIX) IS GIVEN.
34431 217 QUANEWBND1 SOLVES A SYSTEM OF NON-LINEAR EQUATIONS OF WHICH THE JACOBIAN IS A BAND MATRIX.
34432 259 PRAXIS MINIMIZES A FUNCTION OF SEVERAL VARIABLES.
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2-nd REVISION, 1977

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