stichting
mathematisch
centrum

MC

AFDELING NUMERIEKE WISKUNDE ND 1/74 MARCH

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KWIC INDEX FOR CDC AND CERN MATHEMATICAL SOFTWARE AVAILABLE ON THE SARA COMPUTER

2e boerhaavestraat 49 amsterdam

Printed at the Mathematical Centre, 49, 2e Boerhaavestraat, Amsterdam.

Directions for use

The key word in context (KWIC) index is based upon program abstracts such as:

F18HELP FINDS ALL THE $ZEROS OF A $COMPLEX $POLYNOMIAL BY $LEHMERS
$METHOD USING $SCHURS $METHOD FOR ISOLATING ONE ZERO.

The first nine characters ("F18HELP ") of each abstract are a code to identify the program, while the remaining characters until a period comprise a short description of the program (what it does and how it does it), only "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:

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FINDS ALL THE ZEROS OF A     COMPLEX POLYNOMIAL BY LEHMERS METHOD USING
SCHURS METHOD FOR ISOLATING ONE ZERO.                      F18HELP
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If this program is of interest, you can further identify it as follows: the first letter of the code is the programming language (F = Fortran, C = Compass). The next two digits are the literature reference number (18 = Math Science Library, vol. 8, Nonlinear equation solvers); a complete list of literature references is given below. The final six characters of the code are the name ("HELP" in the example) of the program.

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, alphabetical listing of all the abstracts following the KWIC index. In our example; you would first look under language "F", then reference "18", and lastly the program name "HELP"; the complete abstract would follow.

Literature

[1] Matrix algebra subroutines general information manual, CDC pub. no. 60154800 (December 1965), 1-9.

[2] Statistical subroutines reference manual, CDC pub. no. 60135300 (June 1966), 1-67.

Statistical subroutines general information manual, CDC pub. no. 60154700 (December 1965), 1-22.

[3] CERN computer 6000 series program library: Classified list of programs available, amended 21.8.1971.

[11] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 1, Programmed arithmetic.

[12] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 2, Elementary functions.

[13] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 3, Polynomials and special functions.

[14] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 4, Ordinary differential equations.

[15] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 5, Interpolation, approximation, and quadrature.

[16] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 6, Linear algebra.

[17] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 7, Probability, statistics, and time series.

[18] Math Science Library, CDC pub. no. 60327500 (March 1971), vol. 8, Nonlinear equation solvers.

Acknowledgements

The following Mathematical Centre staff members contributed to the production of this KWIC index:

Jack Alanen organized the project and edited the abstracts.
A.C. IJsselstein wrote and ran the EL X8 computer program.
J. Kok abstracted the programs in [18].
P.W. Hemker abstracted the programs in [14] and [15].
W. Hoffmann abstracted the programs in [16].
N.M. Temme abstracted the programs in [13].
A.P.B.M. Vehmeyer abstracted the programs in [17].
D. Winter supplied and advised us on the use of his input/output, file and sort procedures which were written for another program.

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AND SIDES PROVIDED TRIANGULAR	DECOMPOSITION USING CHOLESKY DECOMPOSITION HAS BEEN CARRIED OUT.	F16PDSFBM
SIDES PROVIDED THE TRIANGULAR	DECOMPOSITION WITHOUT PIVOTING HAS BEEN CARRIED OUT, POSSIBLY BY SUBROUTINE BDCWNP.	F16BFBANP
SIDES PROVIDED THE TRIANGULAR	DECOMPOSITION WITH PARTIAL PIVOTING AND IMPLICIT EQUILIBRATION HAS BEEN CARRIED OUT, POSSIBLY BY SUB	F16BFBSUM
SIDES PROVIDED THE TRIANGULAR	DECOMPOSITION WITHOUT PIVOTING HAS BEEN CARRIED OUT AND GIVES AN ESTIMATE FOR THE ACCURACY AND THE C	F16BITRNP
SIDES PROVIDED THE TRIANGULAR	DECOMPOSITION WITH PARTIAL PIVOTING AND IMPLICIT EQUILIBRATION HAS BEEN CARRIED OUT AND GIVES AN EST	F16BITERM
EAST SQUARES PROBLEM PROVIDED	DECOMPOSITION WITH HOUSEHOLDERS METHOD HAS BEEN CARRIED OUT.	F16BSUBHT
ND SIDES PROVIDED TRIANGULAR	DECOMPOSITION WITH PARTIAL PIVOTING ACCORDING TO CROUTS ALGORITHM HAS BEEN CARRIED OUT AND PROVIDES	F16ITERFM
AR SYSTEM PROVIDED TRIANGULAR	DECOMPOSITION WITH PARTIAL PIVOTING ACCORDING TO CROUTS ALGORITHM HAS BEEN CARRIED OUT AND PROVIDES	F16ITERFS
EAST SQUARES PROBLEM PROVIDED	DECOMPOSITION WITH HOUSEHOLDERS METHOD HAS BEEN CARRIED OUT.	F16ITRLSQ
FINITE LINEAR SYSTEM PROVIDED	DECOMPOSITION WITH CHOLESKYS METHOD HAS BEEN CARRIED OUT AND PROVIDES DATA FOR ESTIMATING THE CONDIT	F16ITRPDM
AL RIGHT-HAND SIDES PROVIDED	DECOMPOSITION WITH CHOLESKYS METHOD HAS BEEN CARRIED OUT AND PROVIDES DATA FOR ESTIMATING THE CONDIT	F16ITRPDS
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EEN CARRIED OUT BY SUBROUTINE	DECOM.	F16DETERM
D OUT, POSSIBLY BY SUBROUTINE	DECOM.	F16FBSUBM
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STEM FOR A SYMMETRIC POSITIVE	DEFINITE BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES USING CHOLESKYS METHOD FOR THE TRIANGULAR DECOMPOS	F16BPDITM
STEM FOR A SYMMETRIC POSITIVE	DEFINITE BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED TRIANGULAR DECOMPOSITION BY CHOLESKYS MET	F16BPDFSB
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FINEMENT A SYMMETRIC POSITIVE	DEFINITE LINEAR SYSTEM PROVIDED DECOMPOSITION WITH CHOLESKYS METHOD HAS BEEN CARRIED OUT AND PROVIDE	F16ITRPDM
FINEMENT A SYMMETRIC POSITIVE	DEFINITE LINEAR SYSTEM WITH SEVERAL RIGHT-HAND SIDES PROVIDED DECOMPOSITION WITH CHOLESKYS METHOD H	F16ITRPDS
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SOLVES A POSITIVE	DEFINITE LINEAR SYSTEM WITHOUT USING THE SQUARE ROOT ROUTINE.	F16SPDSOM
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AND ESTIMATING THE CONDITION	NUMBER OF THE MATRIX.	F16PDITRM
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CROUTS ALGORITHM WITH PARTIAL   PIVOTING AND ROW EQUILIBRATION HAS BEEN CARRIED OUT; THE DETERMINANT AND CONDITION NUMBER ARE AVAILA   F16CGITRF
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CROUTS ALGORITHM WITH PARTIAL   PIVOTING AND ROW EQUILIBRATION; THE DETERMINANT IS AVAILABLE.                                          F16DECOM
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OSED WITHOUT USING THE SQUARE   ROOT ROUTINE.                                                                                          F16SPDFBS
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THM WITH PARTIAL PIVOTING AND   ROW EQUILIBRATION.                                                                                     F16GLESOM
THM WITH PARTIAL PIVOTING AND   ROW EQUILIBRATION.                                                                                     F16GLESOS
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DEFINITE LINEAR SYSTEM HAVING   SEVERAL RIGHT-HAND SIDES PROVIDED TRIANGULAR DECOMPOSITION USING CHOLESKY DECOMPOSITION HAS BEEN CAR   F16PDSFBM
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DEFINITE LINEAR SYSTEM HAVING	SEVERAL RIGHT-HAND SIDES PROVIDED THE MATRIX HAS BEEN DECOMPOSED WITHOUT USING THE SQUARE ROOT ROUTI	F16SPDFBS
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   FINDS A REQUIRED NUMBER OF   ZEROS OF A COMPLEX FUNCTION USING A METHOD DESCRIBED BY JARRATT AND NUDDS FOR APPROXIMATION OF ONE Z   F18ZAFUJ
   FINDS A REQUIRED NUMBER OF   ZEROS OF A COMPLEX FUNCTION WITH MULLERS METHOD AND FACTORING OUT PREVIOUSLY FOUND ZEROS,              F18ZAFUM
                    FINDS ALL   ZEROS OF A POLYNOMIAL WITH REAL COEFFICIENTS WITH NEWTONS METHOD OR BAIRSTOWS METHOD BY PERFORMING S   F18PROOT
NDS A REQUIRED NUMBER OF REAL   ZEROS OF A REAL FUNCTION WITH A METHOD DESCRIBED BY JARRATT AND NUDDS FOR APPROXIMATION OF ONE ZERO    F18ZAFUR
                FINDS ALL THE   ZEROS OR A SINGLE ZERO OF A COMPLEX POLYNOMIAL BY MULLERS METHOD WITH DEFLATION,                      F18MULLP
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C12ACOS     COMPUTES THE ARCOSINE TRIGONOMETRIC FUNCTION.
C12ALOG10   COMPUTES THE BASE TEN LOGARITHM OF A REAL ARGUMENT.
C12ALOG     COMPUTES THE NATURAL LOGARITHM OF A REAL ARGUMENT.
C12ASIN     COMPUTES THE ARCSINE TRIGONOMETRIC FUNCTION.
C12ATAN2    COMPUTES THE ARCTANGENT TRIGONOMETRIC FUNCTION OF A QUOTIENT U/V.
C12ATAN     COMPUTES THE ARCTANGENT TRIGONOMETRIC FUNCTION.
C12CBRT     COMPUTES THE CUBE ROOT OF A REAL ARGUMENT.
C12CCOS     COMPUTES THE COMPLEX COSINE TRIGONOMETRIC FUNCTION.
C12CEXP     COMPUTES THE EXPONENTIAL FUNCTION OF A COMPLEX ARGUMENT.
C12CLOG     COMPUTES THE NATURAL LOGARITHM OF A COMPLEX ARGUMENT.
C12COS      COMPUTES THE COSINE TRIGONOMETRIC FUNCTION.
C12CSIN     COMPUTES THE COMPLEX SINE TRIGONOMETRIC FUNCTION.
C12CSQRT    COMPUTES THE SQUARE ROOT OF A COMPLEX ARGUMENT.
C12DATAN2   COMPUTES THE DOUBLE PRECISION ARCTANGENT TRIGONOMETRIC FUNCTION OF A QUOTIENT U/V.
C12DATAN    COMPUTES THE DOUBLE PRECISION ARCTANGENT TRIGONOMETRIC FUNCTION.
C12DCOS     COMPUTES THE DOUBLE PRECISION COSINE TRIGONOMETRIC FUNCTION.
C12DEXP     COMPUTES THE EXPONENTIAL FUNCTION OF A DOUBLE PRECISION REAL ARGUMENT.
C12DLOG10   COMPUTES THE BASE TEN LOGARITHM OF A DOUBLE PRECISION REAL ARGUMENT.
C12DLOG     COMPUTES THE NATURAL LOGARITHM OF A DOUBLE PRECISION REAL ARGUMENT.
C12DSIN     COMPUTES THE DOUBLE PRECISION SINE TRIGONOMETRIC FUNCTION.
C12DSQRT    COMPUTES THE SQUARE ROOT OF A DOUBLE PRECISION REAL ARGUMENT.
C12EXP      COMPUTES THE EXPONENTIAL FUNCTION OF A REAL ARGUMENT.
C12PS1132   A SET OF PROGRAMS TO PERFORM GENERAL EXPONENTIATION, A**B, FOR VARIOUS COMBINATIONS OF A AND B, INTEGER, REAL, COMPLEX, AND DOUBLE PR
            ECISION.
C12SINH     COMPUTES THE HYPERBOLIC SINE TRIGONOMETRIC FUNCTION.
C12SIN      COMPUTES THE SINE TRIGONOMETRIC FUNCTION.
C12SQRT     COMPUTES THE SQUARE ROOT OF A REAL ARGUMENT.
C12TANH     COMPUTES THE HYPERBOLIC TANGENT TRIGONOMETRIC FUNCTION.
C12TAN      COMPUTES THE TANGENT TRIGONOMETRIC FUNCTION.
C16FABSV    MATRIARCH SUBROUTINE TO COMPUTE THE EUCLIDIAN NORM OF A VECTOR.
C16FCOMB    MATRIARCH SUBROUTINE TO SUBTRACT A CONSTANT TIMES A VECTOR FROM ANOTHER VECTOR.
C16FMMX     MATRIARCH SUBROUTINE TO PERFORM A MATRIX MATRIX MULTIPLICATION.
C16FMTMX    MATRIARCH SUBROUTINE TO MULTIPLY A TRANSPOSED MATRIX BY A MATRIX ON THE RIGHT.
C16FMTR     MATRIARCH SUBROUTINE TO TRANSPOSE A RECTANGULAR MATRIX.
C16FMTVCX   MATRIARCH SUBROUTINE TO MULTIPLY A TRANSPOSED COMPLEX MATRIX BY A COMPLEX VECTOR.
C16FMTVX    MATRIARCH SUBROUTINE TO MULTIPLY A TRANSPOSED MATRIX BY A VECTOR.
C16FMVCX    MATRIARCH SUBROUTINE TO MULTIPLY A COMPLEX MATRIX BY A COMPLEX VECTOR.
C16FMVX     MATRIARCH SUBROUTINE TO DO A MATRIX VECTOR MULTIPLICATION.
C16FNORM1   MATRIARCH SUBROUTINE TO NORMALIZE A VECTOR IN THE 2 NORM.
C16FPUR     MATRIARCH SUBROUTINE TO SUBTRACT FROM A VECTOR ITS COMPONENT ALONG ANOTHER VECTOR.
C16SMTVX    MATRIARCH SUBROUTINE TO MULTIPLY A TRANSPOSED LARGE SPARSE MATRIX BY A VECTOR ON THE RIGHT.
C16SMVX     MATRIARCH SUBROUTINE TO MULTIPLY A LARGE SPARSE MATRIX BY A VECTOR ON THE RIGHT.
C16VIP      ONE OF A SET OF SUBROUTINES TO CALCULATE THE INNER PRODUCT OF TWO VECTORS WHICH MAY BE A COLUMN OR A ROW OF A MATRIX USING EITHER SIN
            GLE OR DOUBLE PRECISION; OTHER SUBROUTINES ARE VIPA, VIPS, VIPD, VIPDA, VIPDS, INRPRD, PRDSUM.
F11FAFRAC   ADDS TWO FRACTIONS AND EXPRESSES THE RESULT AS A FRACTION IN ITS LOWEST TERMS.
F11FFRAC    CHANGES A VECTOR WITH FRACTIONAL COMPONENTS INTO ONE WITH INTEGER COMPONENTS TIMES A SCALAR FUNCTION.
F11FMFRAC   MULTIPLIES TWO FRACTIONS AND EXPRESSES THE RESULT AS A FRACTION IN ITS LOWEST TERMS.
F11HCF      FINDS THE HIGHEST COMMON FACTOR OF TWO INTEGERS BY EUCLIDS ALGORITHM.
F11LCM      FINDS THE LEAST COMMON MULTIPLE OF TWO INTEGERS BY USING SUBROUTINE HCF.
F12CBAREX   EVALUATES GENERAL EXPONENTIATION C**R FOR COMPLEX BASE AND REAL EXPONENT.
F12COSH     COMPUTES THE HYPERBOLIC COSINE TRIGONOMETRIC FUNCTION.
F13ADR      COMPUTES THE COEFFICIENTS OF THE SUM OF TWO REAL POLYNOMIALS.
F13AMCON    PROVIDES CERTAIN MACHINE AND MATHEMATICAL CONSTANTS AS SINGLE PRECISION NUMBERS OF MAXIMUM ACCURACY.
F13BESNIS   COMPUTES A SEQUENCE OF MODIFIED BESSEL FUNCTIONS OF THE FIRST KIND FOR REAL ARGUMENT BY USING BACKWARD RECURSION.
F13BESNKS   COMPUTES A SEQUENCE OF MODIFIED BESSEL FUNCTIONS OF THE SECOND KIND FOR REAL ARGUMENT BY USING POLYNOMIAL APPROXIMATIONS AND THE SUBR
            OUTINE BESNIS.
F13BSJ      COMPUTES A SWQUENCE OF SPHERICAL BESSEL FUNCTIONS OF THE FIRST KIND FOR REAL ARGUMENT BY FORWARD OR BACKWARD RECURSION WITH STARTING
            VALUES.
F13CADR     COMPUTES THE COEFFICIENTS OF THE SUM OF TWO COMPLEX POLYNOMIALS.
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F13CCOMPE	EVALUATES A POLYNOMIAL HAVING COMPLEX COEFFICIENTS AT A COMPLEX POINT BY SUMMING THE PRODUCT OF THE POWERS TIMES THE COEFFICIENTS.
F13CDERIV	COMPUTES THE COEFFICIENTS OF A POLYNOMIAL WHICH IS THE DERIVATIVE OF ANOTHER COMPLEX POLYNOMIAL GIVEN THE COEFFICIENTS OF THE LATTER.
F13CEL3	COMPUTES THE COMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND BY THE LANDEN TRANSFORMATION.
F13CINT	COMPUTES THE COEFFICIENTS OF A POLYNOMIAL WHICH IS THE INTEGRAL OF ANOTHER COMPLEX POLYNOMIAL GIVEN THE COEFFICIENTS OF THE LATTER.
F13CLDIV	DIVIDES A COMPLEX POLYNOMIAL BY A LINEAR FACTOR, X+B, WHERE B MAY BE COMPLEX.
F13CMPYR	FINDS THE PRODUCT OF TWO COMPLEX POLYNOMIALS.
F13COMBES	COMPUTES SEQUENCES OF THE BESSEL FUNCTIONS OF THE FIRST OR SECOND KINDS FOR COMPLEX ARGUMENT AND COMPLEX ORDER.
F13COMPEV	EVALUATES A REAL POLYNOMIAL AT A COMPLEX POINT BY FACTORIZING WITH A QUADRATIC TERM.
F13CPDIV	PROVIDES THE QUOTIENT AND REMAINDER OBTAINED BY DIVIDING ONE COMPLEX POLYNOMIAL BY ANOTHER.
F13CPTRAN	EFFECTS A COORDINATE TRANSLATION IN THE ARGUMENT OF A COMPLEX POLYNOMIAL.
F13CQDIV	DIVIDES A COMPLEX POLYNOMIAL BY A QUADRATIC EXPRESSION.
F13CREV	REVERSES THE ORDER OF COMPLEX POLYNOMIAL COEFFICIENTS IN AN ARRAY.
F13CSBR	COMPUTES THE COEFFICIENTS OF THE DIFFERENCE OF TWO COMPLEX POLYNOMIALS.
F13CSHRNK	COMPUTES THE COEFFICIENTS OF THE COMPLEX POLYNOMIAL P(AX) FROM THE COEFFICIENTS OF P(X).
F13DERIV	COMPUTES THE COEFFICIENTS OF A POLYNOMIAL WHICH IS THE DERIVATIVE OF ANOTHER REAL POLYNOMIAL GIVEN THE COEFFICIENTS OF THE LATTER.
F13EL3	EVALUATES THE INCOMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND BY USING THE GAUSS TRANSFORMATION; COULD BE USED FOR COMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND SOMETIMES.
F13ELF	EVALUATES THE INCOMPLETE ELLIPTIC INTEGRAL OF THE FIRST AND SECOND KINDS BY USING LANDENS TRANSFORMATION.
F13ELK	EVALUATES THE COMPLETE ELLIPTIC INTEGRAL OF THE FIRST AND SECOND KINDS BY USING LANDENS TRANSFORMATION.
F13ERFINV	COMPUTES THE INVERSE OF THE ERROR FUNCTION BY NEWTONS METHOD.
F13ERF	COMPUTES THE ERROR FUNCTION BY EXPANSION IN CHEBYSHEV SERIES.
F13EVREAL	EVALUATES A POLYNOMIAL HAVING REAL COEFFICIENTS AT A REAL VALUE OF THE INDEPENDENT VARIABLE BY NESTED MULTIPLICATION.
F13FMULT1	MULTIPLIES A POLYNOMIAL BY A LINEAR FACTOR.
F13GAMMA	EVALUATES THE GAMMA FUNCTION OF A REAL ARGUMENT BY USING RATIONAL APPROXIMATION.
F13HANKEL	EVALUATES THE COMPLEX VALUED HANKEL FUNCTION FOR REAL ARGUMENT AND INTEGER ORDER BY SUMMATION OF SERIES FOR BESSEL FUNCTIONS.
F13INT	COMPUTES THE COEFFICIENTS OF A POLYNOMIAL WHICH IS THE INTEGRAL OF ANOTHER REAL POLYNOMIAL GIVEN THE COEFFICIENTS OF THE LATTER.
F13LDIV	DIVIDES A REAL POLYNOMIAL BY A LINEAR FACTOR, X+B, WHERE B MAY BE COMPLEX.
F13LOGGAM	COMPUTES THE NATURAL LOGARITHM OF THE GAMMA FUNCTION FOR COMPLEX ARGUMENT BY USING CONTINUED FRACTIONS.
F13MPYR	FINDS THE PRODUCT OF TWO REAL POLYNOMIALS.
F13NBESJ	COMPUTES BESSEL FUNCTIONS OF THE FIRST KIND FOR REAL ARGUMENT AND INTEGER ORDERS BY USING BACKWARD RECURSION.
F13PARFAC	RESOLVES A RATIONAL FUNCTION INTO PARTIAL FRACTIONS GIVEN THE ROOTS OF THE DENOMINATOR POLYNOMIAL AND THE COEFFICIENTS OF THE NUMERATOR POLYNOMIAL.
F13PDIV	PROVIDES THE QUOTIENT AND REMAINDER OBTAINED BY DIVIDING ONE REAL POLYNOMIAL BY ANOTHER.
F13PTRAN	EFFECTS A COORDINATE TRANSLATION IN THE ARGUMENT OF A REAL POLYNOMIAL.
F13QDIV	DIVIDES A REAL POLYNOMIAL BY A QUADRATIC EXPRESSION.
F13RBESY	COMPUTES A SEQUENCE OF BESSEL FUNCTIONS OF THE SECOND KIND FOR POSITIVE REAL ARGUMENT AND INTEGER ORDERS.
F13REV	REVERSES THE ORDER OF REAL POLYNOMIAL COEFFICIENTS IN AN ARRAY.
F13SBR	COMPUTES THE COEFFICIENTS OF THE DIFFERENCE OF TWO REAL POLYNOMIALS.
F13SHRINK	COMPUTES THE COEFFICIENTS OF THE REAL POLYNOMIAL P(AX) FROM THE COEFFICIENTS OF P(X).
F13SICI	EVALUATES THE SINE AND COSINE INTEGRALS USING CHEBYSHEV APPROXIMATIONS.
F14BLCKDQ	SOLVES A SYSTEM OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS USING A PREDICTOR CORRECTOR METHOD OF EIGHTH ORDER AND PICARDS METHOD OF SUCCESSIVE SUBSTITUTION.
F14BVD	SOLVES NONLINEAR BOUNDARY VALUE PROBLEMS IN ORDINARY DIFFERENTIAL EQUATIONS BY COMBINING AN INITIAL VALUE SOLVER WITH A NONLINEAR EQUATION SOLVING PROGRAM.
F14DRATEX	SOLVES A SYSTEM OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS USING A RATIONAL EXTRAPOLATION TECHNIQUE BASED ON A MODIFIED MIDPOINT RULE; EFFICIENT FOR HIGH ACCURACY WORK.
F14LINBVD	SOLVES LINEAR BOUNDARY VALUE PROBLEMS IN A SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS, WHERE THE SOLUTION IS BASED ON THE PRINCIPLE OF SUPERPOSITION, USING SUBROUTINE BLCKDQ TO PERFORM THE SOLUTION OF THE REQUIRED INITIAL VALUE PROBLEMS.
F14NRKUS	SOLVES DIFFERENTIAL EQUATIONS AS PROCEDURE RKINIT BUT RUNS FASTER AND REQUIRES MORE STORAGE.
F14RKINIT	SOLVES A SYSTEM OF FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS USING A VARIABLE STEP RUNGE KUTTA TECHNIQUE EFFICIENT FOR LOW ACCURACY WORK.
F15ACFI	PERFORMS A SINGLE CONTINUED FRACTION INTERPOLATION USING INVERTED DIFFERENCES ON TABULAR DATA WITH ARBITRARY SPACING.
F15AITKEN	COMPUTES BY AITKENS METHOD THE POLYNOMIAL INTERPOLATED VALUE AT A GIVEN ABSCISSA, GIVEN N POINTS TO FIT EXACTLY BY A POLYNOMIAL OF DEGREE N-1 (N<11).
F15CFQME	CONSTRUCTS, USING THE EXCHANGE ALGORITHM, THE MINIMAX POLYNOMIAL THROUGH A DISCRETE, WEIGHTED SET OF POINTS.
F15CHEBAP	CONSTRUCTS THE COEFFICIENTS OF THE CHEBYCHEFF POLYNOMIAL THAT GIVES A CLOSE APPROXIMATION TO A MINIMAX FIT OF A GIVEN FUNCTION OVER A GIVEN INTERVAL.
F15COMCUB	CONSTRUCTS CUBIC SPLINE THROUGH N POINTS; MONOTONE ABSCISSAS REQUIRED; SECOND ORDER CONTINUITY.
F15COSEVL	EVALUATES A COSINE POLYNOMIAL AT A GIVEN POINT.

F15DERIV	CONSTRUCTS COEFFICIENTS OF A POLYNOMIAL WHICH IS THE DERIVATIVE OF ANOTHER POLYNOMIAL GIVEN THE COEFFICIENTS OF THE LATTER.
F15DIFTAB	DIFFERENTIATES NUMERICALLY A FUNCTION GIVEN AS A TABLE WITH EQUISPACED ARGUMENTS, AT A TABULAR POINT OR AT THE MIDPOINT OF AN INTERVAL.
F15FCLSQ	CONSTRUCTS A LEAST SQUARES POLYNOMIAL OF A SPECIFIED DEGREE WHOSE GRAPH APPROXIMATES A SET OF DATA POINTS WITH WEIGHT ATTACHED TO EACH POINT AND IS CONSTRAINED TO PASS THROUGH SOME OF THE DATA POINTS.
F15FDLSQ	CONSTRUCTS A LEAST SQUARES POLYNOMIAL APPROXIMATION OF SOME PREASSIGNED DEGREE TO A SET OF DATA POINTS WITH GIVEN WEIGHT WHERE THE POLYNOMIAL IS CONSTANT AT N POINTS AND THE DERIVATIVE IS ALSO CONSTRAINED AT M OF THE N POINTS.
F15FHRNEW	CONSTUCTS COEFFICIENTS OF THE N+M+1 DEGREE HERMITIAN INTERPOLATING POLYNOMIAL THROUGH N+1 POINTS WITH FIRST DERIVATIVES GIVEN AT THE FIRST M+1 POINTS (M NOT GREATER THAN N).
F15FITLIN	CONSTRUCTS A BEST FITTING LINE TO A NUMBER OF DATA POINTS, IN THE SENSE THAT THE SUM OF THE SQUARES OF THE PERPENDICULAR DISTANCES FROM THE POINT TO THE LINE IS A MINIMUM.
F15FLGNEW	CONSTRUCTS COEFFICIENTS OF THE N-TH DEGREE LAGRANGIAN INTERPOLATING POLYNOMIAL THROUGH N+1 POINTS.
F15FLSQFY	FINDS BY THE METHOD OF LEAST SQUARES A POLYNOMIAL OF SPECIFIED DEGREE WHOSE GRAPH APPROXIMATES A SET OF DATA POINTS WITH WEIGHT ATTACHED TO EACH POINT, USING ORTHOGONAL POLYNOMIALS.
F15FOURAP	CONSTRUCTS COEFFICIENTS OF THE BEST FOURIER SERIES WITH LINEAR TREND, IN THE LEAST SQUARES SENSE, TO A SET OF EQUISPACED DATA.
F15FOURI	CONSTRUCTS COEFFICIENTS OF A FINITE FOURIER SERIES WITH A LINEAR TREND THROUGH A SET OF EQUISPACED POINTS.
F15GMI	EVALUATES A M-TUPLE INTEGRAL (M LESS 11) OF AN INTEGRAND BETWEEN ARBITRARY LIMITS; THE INTEGRATION IS PERFORMED BY USING A 5-POINT GAUSS LEGENDRE FORMULA TO A NUMBER OF SUBINTERVALS SPECIFIED BY THE USER.
F15HERMIT	EVALUATES AN EXPONENTIAL INTEGRAL BY HERMITE GAUSS QUADRATURE FORMULAS.
F15HRMT1	PERFORMS HERMITE INTERPOLATION AT ONE POINT GIVEN THE ABSCISSA AND A TABLE OF CORRESPONDING VALUES OF THE INDEPENDENT AND DEPENDENT VARIABLES AND ITS FIRST DERIVATIVE.
F15HRMT2	PERFORMS HERMITE INTERPOLATION FOR SEVERAL VALUES OF INDEPENDENT VARIABLE.
F15LAGDIF	DIFFERENTIATES NUMERICALLY AN EQUALLY SPACED TABULAR FUNCTION AT ANY POINT USING AN INTERPOLATING POLYNOMIAL OF SPECIFIED ORDER.
F15LAGINT	COMPUTES THE LAGRANGIAN POLYNOMIAL INTERPOLATED VALUE AT A GIVEN ABSCISSA, GIVEN N POINTS TO FIT EXACTLY BY A POLYNOMIAL OF DEGREE N-1.
F15LAGRAN	EVALUATES THE INTEGRAL OF A REAL FUNCTION OF ONE VARIABLE BASED ON LAGRANGIAN INTERPOLATION.
F15LAGUER	EVALUATES AN EXPONENTIAL INTEGRAL BY LAGUERRE GAUSS QUADRATURE FORMULAS.
F15LEGEND	EVALUATES THE INTEGRAL OF ONE VARIABLE OVER A FINITE INTERVAL USING LEGENDRE GAUSS QUADRATURE FORMULAS.
F15MIGEN	CONSTRUCTS A MINIMAX FUNCTION APPROXIMATION TO A SET OF GIVEN POINTS IN TERMS OF A LINEAR COMBINATION OF A PRESCRIBED SET OF AT MOST SEVEN FUNCTIONS.
F15MILN2	SMOOTHS A SET OF DATA; EACH SMOOTHED ORDINATE IS OBTAINED AS A WEIGHTED AVERAGE OF A SPECIFIED NUMBER OF OTHER POINTS IN ITS NEIGHBORHOOD.
F15MINRAT	CONSTRUCTS A MINIMAX RATIONAL FUNCTION APPROXIMATION OF GIVEN DEGREE TO A DISCRETE DATA SET.
F15NRICH	ENRICHES A SET OF POINTS BY ADDING POINTS ON AN INTERPOLATING CURVE THROUGH THE GIVEN POINTS; POINTS ARE GENERATED ON A CUBIC INTERPOLATING CURVE.
F15ORTHFT	FITS, IN THE SENSE OF LEAST SQUARES, TO A GIVEN SET OF POINTS THE BEST LINEAR COMBINATION OF A SET OF PRESCRIBED GENERAL FUNCTIONS OF ONE OR MORE VARIABLES.
F15PADE	CONSTRUCTS THE COEFFICIENTS OF THE PADE APPROXIMATION TO A FUNCTION OF WHICH THE MACLAURIN EXPANSION IS GIVEN.
F15PARBC	EVALUATES THE INTEGRAL BY SIMPSONS RULE OF A BOUNDED FUNCTION OF ONE VARIABLE OVER A FINITE INTERVAL OF EQUISPACED VALUES.
F15PRONY	CONSTRUCTS AN APPROXIMATION, WHICH IS THE SUM OF A PRESCRIBED NUMBER OF EXPONENTIALS, TO A SET OF N EQUALLY SPACED DATA POINTS.
F15QUAD	EVALUATES THE INTEGRAL OF A FUNCTION OF ONE VARIABLE OVER A FINITE INTERVAL, USING LEGENDRE GAUSS FORMULAS AND UNEQUAL SUBINTERVALS.
F15RATL	CONSTRUCTS, IN THE SENSE OF LEAST SQUARES, THE BEST APPROXIMATION TO A SET OF DATA POINTS BY A RATIONAL FUNCTION WITH NUMERATOR AND DENOMINATOR OF A SPECIFIED DEGREE.
F15RICH	ENRICHES A GIVEN CURVE DEFINED BY AN ARRAY OF POINTS SO AS TO SATISFY A SPECIFIED CHORD HEIGHT TOLERANCE USING AN INTERPOLATING FUNCTION WHICH ATTEMPTS TO MINIMIZE THE RIPPLE IN CURVATURE.
F15ROMBG	EVALUATES THE INTEGRAL OF A FUNCTION OF ONE VARIABLE OVER A FINITE INTERVAL USING ROMBERG INTEGRATION.
F15SIGSMT	PERFORMS SMOOTHING OF A FOURIER SERIES BY USE OF LANCZOS SIGMA FACTORS.
F15SIMPRC	EVALUATES THE INTEGRAL OF A FUNCTION OVER A FINITE INTERVAL USING SIMPSONS RULE.
F15SINEVL	EVALUATES A SINE POLYNOMIAL AT A GIVEN POINT.
F15SINSER	CONSTRUCTS COEFFICIENTS OF A SINE POLYNOMIAL WITH A LINEAR TREND GIVEN A SET OF (ABSCISSA, ORDINATE) PAIRS WITH ARBITRARY SPACING.
F15SMOCUB	PERFORMS SMOOTHING OF A TWO DIMENSIONAL DATA SET BY MOVING EACH OF THE INPUT DATA POINTS TOWARD A CUBIC THROUGH THE ADJACENT POINTS HAVING SLOPES AT THOSE POINTS DETERMINED BY THE CUBIC SPLINE THROUGH THE WHOLE DATA SET.
F15SMOOTH	COMPUTES NP SMOOTHED FUNCTION VALUES GIVEN A SET OF NP ARGUMENT AND NP FUNCTION VALUES; THE SMOOTHING IS OBTAINED BY EVALUATING THE LEAST SQUARES POLYNOMIAL OF DEGREE N BASED ON SUCCESSIVE POINTS.
F15SPLINE	CONSTRUCTS A FIFTH DEGREE SPLINE INTERPOLATING A SET OF EQUISPACED DATA.
F15SURFS	FITS A SMOOTH SURFACE WITH CONTINUOUS FIRST PARTIAL DERIVATIVES TO A SET OF POINTS DEFINED OVER A RECTANGULAR GRID WITH ARBITRARY SPACING IN EACH DIRECTION.
F15TBLU1	LAGARANGIAN INTERPOLATION IN ONE DIMENSIONAL TABLE; ARBITRARY ORDER.
F15TBLU2	LAGRANGIAN INTERPOLATION IN TWO DIMENSIONAL TABLE; ARBITRARY ORDER.
F15TBLU3	LAGRANGIAN INTERPOLATION IN THREE DIMENSIONAL TABLE; ARBITRARY ORDER.

F15TRGDIF	CONSTRUCTS COEFFICIENTS OF THE DERIVATIVE OF A FOURIER SERIES, GIVEN THE COEFFICIENTS OF THE TRIGONOMETRIC POLYNOMIAL.
F15TRGINT	CONSTRUCTS COEFFICIENTS OF THE FOURIER SERIES WITH A LINEAR TREND THAT IS OBTAINED BY INTEGRATION OF A TRIGONOMETRIC POLYNOMIAL.
F15UNCSPL	CONSTRUCTS A NONLINEAR CUBIC SPLINE INTERPOLATING A SET OF POINTS WITH ARBITRARY SPACING.
F16BALANC	BALANCES A COMPLEX MATRIX BY MEANS OF DIAGONAL SIMILARITY TRANSFORMATIONS.
F16BANEIG	COMPUTES THE SMALLEST EIGENVALUES AND ASSOCIATED EIGENVECTORS OF A SYMMETRIC, NONNEGATIVE DEFINITE, NARROW BANDMATRIX USING THE METHOD OF INVERSE WIELANDT ITERATION WITH PERIODIC RAYLEIGH QUOTIENT SHIFTING COMBINED WITH A STABLE, BAND-PRESERVING DEFLATION TECHNIQUE.
F16BCHSDC	DECOMPOSES BY THE CHOLESKY METHOD A REAL, SYMMETRIC POSITIVE DEFINITE BANDMATRIX INTO UPPER AND LOWER TRIANGULAR FACTORS.
F16BDCWNP	DECOMPOSES BY GAUSSIAN ELIMINATION WITHOUT PIVOTING A REAL BANDMATRIX INTO UPPER AND LOWER TRIANGULAR FACTORS; THE DETERMINANT IS ALSO AVAILABLE.
F16BDECOM	DECOMPOSES BY GAUSSIAN ELIMINATION WITH PARTIAL PIVOTING AND IMPLICIT EQUILIBRATION A REAL BANDMATRIX INTO UPPER AND LOWER TRIANGULAR FACTORS.
F16BFBANP	SOLVES A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED THE TRIANGULAR DECOMPOSITION WITHOUT PIVOTING HAS BEEN CARRIED OUT, POSSIBLY BY SUBROUTINE BDCWNP.
F16BFBSUM	SOLVES A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED THE TRIANGULAR DECOMPOSITION WITH PARTIAL PIVOTING AND IMPLICIT EQUILIBRATION HAS BEEN CARRIED OUT, POSSIBLY BY SUBROUTINE BDECOM.
F16BITERM	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED THE TRIANGULAR DECOMPOSITION WITH PARTIAL PIVOTING AND IMPLICIT EQUILIBRATION HAS BEEN CARRIED OUT AND GIVES AN ESTIMATE FOR THE ACCURACY AND THE CONDITION NUMBER.
F16BITRFM	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES USING GAUSSIAN ELIMINATION WITH PARTIAL PIVOTING AND IMPLICIT EQUILIBRATION AND GIVES AN ESTIMATE FOR THE ACCURACY AND THE CONDITION NUMBER.
F16BITRNP	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED THE TRIANGULAR DECOMPOSITION WITHOUT PIVOTING HAS BEEN CARRIED OUT AND GIVES AN ESTIMATE FOR THE ACCURACY AND THE CONDITION NUMBER.
F16BITRPD	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A SYMMETRIC POSITIVE DEFINITE BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED TRIANGULAR DECOMPOSITION BY CHOLESKYS METHOD HAS BEEN CARRIED OUT.
F16BITWNP	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES USING GAUSSIAN ELIMINATION WITHOUT PIVOTING AND GIVES AN ESTIMATE FOR THE ACCURACY AND THE CONDITION NUMBER.
F16BLESOM	SOLVES A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES USING GAUSSIAN ELIMINATION WITH PARTIAL PIVOTING AND IMPLICIT EQUILIBRATION; THE DETERMINANT IS ALSO AVAILABLE.
F16BLSWNP	SOLVES A LINEAR SYSTEM FOR A BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES USING GAUSSIAN ELIMINATION WITHOUT PIVOTING; THE DETERMINANT IS ALSO AVAILABLE.
F16BPDFSB	SOLVES A LINEAR SYSTEM FOR A SYMMETRIC POSITIVE DEFINITE BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED TRIANGULAR DECOMPOSITION BY CHOLESKYS METHOD HAS BEEN CARRIED OUT, POSSIBLY BY SUBROUTINE BCHSDC.
F16BPDITM	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A SYMMETRIC POSITIVE DEFINITE BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES USING CHOLESKYS METHOD FOR THE TRIANGULAR DECOMPOSITION.
F16BPDSOM	SOLVES A LINEAR SYSTEM FOR A SYMMETRIC POSITIVE DEFINITE BANDMATRIX WITH SEVERAL RIGHT-HAND SIDES USING CHOLESKYS METHOD FOR THE TRIANGULAR DECOMPOSITION.
F16BSUBHT	SOLVES A LEAST SQUARES PROBLEM PROVIDED DECOMPOSITION WITH HOUSEHOLDERS METHOD HAS BEEN CARRIED OUT.
F16CCONGR	SOLVES A LEAST SQUARES PROBLEM FOR A COMPLEX SYSTEM USING THE METHOD OF CONJUGATE GRADIENT.
F16CDECOM	DECOMPOSES A COMPLEX MATRIX INTO TRIANGULAR FACTORS USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION; ALSO COMPUTES ITS DETERMINANT.
F16CFBSUM	SOLVES A LINEAR SYSTEM FOR A COMPLEX MATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED THE TRIANGULAR DECOMPOSITION FOLLOWING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION HAS BEEN CARRIED OUT, POSSIBLY BY SUBROUTINE CDECOM.
F16CGITRF	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A COMPLEX MATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED THE TRIANGULAR DECOMPOSITION ACCORDING TO CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION HAS BEEN CARRIED OUT; THE DETERMINANT AND CONDITION NUMBER ARE AVAILABLE.
F16CGLESM	SOLVES A LINEAR SYSTEM FOR A COMPLEX MATRIX WITH SEVERAL RIGHT-HAND SIDES USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION.
F16CHSDEC	DECOMPOSES A SYMMETRIC POSITIVE DEFINITE MATRIX INTO TRIANGULAR FACTORS USING CHOLESKYS METHOD; THE DETERMINANT IS AVAILABLE.
F16CINPRD	COMPUTES THE DOUBLE PRECISION INNER PRODUCT OF TWO VECTORS HAVING COMPLEX ELEMENTS.
F16CITERF	SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM FOR A COMPLEX MATRIX WITH SEVERAL RIGHT-HAND SIDES PROVIDED TRIANGULAR DECOMPOSITION ACCORDING TO CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION HAS BEEN CARRIED OUT AND GIVES AN ESTIMATE FOR THE ACCURACY AND THE CONDITION NUMBER.
F16DCBHT	TRANSFORMS A MATRIX INTO UPPER TRIANGULAR FORM BY HOUSEHOLDERS METHOD.
F16DCWNE	DECOMPOSES A MATRIX INTO TRIANGULAR FACTORS USING CROUTS ALGORITHM WITH PARTIAL PIVOTING WITHOUT ROW EQUILIBRATION; THE DETERMINANT IS AVAILABLE.
F16DCWNP	DECOMPOSES A MATRIX INTO TRIANGULAR FACTORS USING CROUTS ALGORITHM WITHOUT PIVOTING; THE DETERMINANT IS AVAILABLE.
F16DECOM	DECOMPOSES A MATRIX INTO TRIANGULAR FACTORS USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION; THE DETERMINANT IS AVAILABLE.
F16DEIG	SOLVES THE EIGENSYSTEM FOR THE SECOND ORDER DIFFERENTIAL EQUATION A*X.

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F16DETERM  CALCULATES MANTISSA AND EXPONENT (BASE 2) OF THE DETERMINANT OF A MATRIX PROVIDED TRIANGULAR DECOMPOSITION USING CROUTS ALGORITHM WIT
           H PARTIAL PIVOTING AND ROW EQUILIBRATION HAS BEEN CARRIED OUT BY SUBROUTINE DECOM.
F16DTSHFT  CALCULATES A GUESS OF AN EIGENVALUE TO A COMPLEX HESSENBERG MATRIX USING HYMANS METHOD TO EVALUATE THE DETERMINANT.
F16EIG5    CALCULATES SOME EIGENVALUES OF A REAL MATRIX BY MEANS OF A MODIFICATION OF LAGUERRES METHOD.
F16EIGCHK  IMPROVES AN APPROXIMATE EIGENVALUE EIGENVECTOR PAIR OF A REAL SYMMETRIC MATRIX BY CALCULATING THE RAYLEIGH QUOTIENT AND GIVES ERROR B
           OUNDS.
F16EIGCO1  CALCULATES THE EIGENVALUE EIGENVECTOR PAIR WHICH IS NEAREST TO AN APPROXIMATION OF AN EIGENVALUE OF A REAL MATRIX HAVING DISTINCT REA
           L EIGENVALUES.
F16EIGIMP  REFINES AN EIGENVECTOR BELONGING TO A SINGLE REAL EIGENVALUE OF A REAL HESSENBERG MATRIX BY MEANS OF WIELANDT INVERSE ITERATION.
F16EIGSYM  CALCULATES ALL EIGENVALUES AND SOME EIGENVECTORS OF A REAL SYMMETRIC MATRIX.
F16EIGVCH  CALCULATES AN EIGENVECTOR BELONGING TO A SINGLE REAL EIGENVALUE OF A REAL HESSENBERG MATRIX BY MEANS OF INVERSE ITERATION.
F16FBSUBM  SOLVES A LINEAR SYSTEM WITH SEVERAL RIGHT-HAND SIDES  PROVIDED TRIANGULAR DECOMPOSITION ACCORDING TO CROUTS ALGORITHM WITH PARTIAL PI
           VOTING AND ROW EQUILIBRATION HAS BEEN CARRIED OUT, POSSIBLY BY SUBROUTINE DECOM.
F16FBSUBS  SOLVES A LINEAR SYSTEM PROVIDED TRIANGULAR DECOMPOSITION ACCORDING TO CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION HA
           S BEEN CARRIED OUT.
F16FCGM2   SOLVES A RECTANGULAR LINEAR REAL SYSTEM IN THE SENSE OF LEAST SQUARES ACCORDING TO THE CONJUGATE GRADIENT METHOD.
F16GITRFM  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM WITH SEVERAL RIGHT-HAND SIDES  USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW
           EQUILIBRATION AND PROVIDES DATA FOR ESTIMATING THE DETERMINANT AND CONDITION NUMBER OF THE MATRIX AND THE NUMBER OF CORRECT DIGITS IN
            THE FIRST COMPUTED SOLUTION.
F16GITRFS  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION AND PROVIDES DATA
            FOR ESTIMATING THE DETERMINANT AND CONDITION NUMBER OF THE MATRIX AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION.
F16GLESOM  SOLVES A LINEAR SYSTEM WITH SEVERAL RIGHT-HAND SIDES  ACCORDING TO CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION.
F16GLESOS  SOLVES A LINEAR SYSTEM ACCORDING TO CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION.
F16HSSN    TRANSFORMS A REAL MATRIX TO UPPER HESSENBERG FORM USING WILKINSONS METHOD.
F16INVERS  INVERTS A MATRIX USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION.
F16INVITR  INVERTS WITH ITERATIVE REFINEMENT A MATRIX USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQUILIBRATION.
F16ITERFM  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM WITH SEVERAL RIGHT-HAND SIDES  PROVIDED TRIANGULAR DECOMPOSITION WITH PARTIAL PIVOTI
           NG ACCORDING TO CROUTS ALGORITHM HAS BEEN CARRIED OUT AND PROVIDES DATA FOR CALCULATING THE DETERMINANT AND CONDITION NUMBER OF THE M
           ATRIX.
F16ITERFS  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM PROVIDED TRIANGULAR DECOMPOSITION WITH PARTIAL PIVOTING ACCORDING TO CROUTS ALGORITH
           M HAS BEEN CARRIED OUT AND PROVIDES DATA FOR CALCULATING THE DETERMINANT AND CONDITION NUMBER OF THE MATRIX.
F16ITERIN  REFINES ITERATIVELY THE INVERSE OF A MATRIX PROVIDED TRIANGULAR DECOMPOSITION USING CROUTS ALGORITHM WITH PARTIAL PIVOTING AND ROW EQ
           UILIBRATION HAS BEEN CARRIED OUT.
F16ITRLSQ  REFINES ITERATIVELY A SOLUTION OF A LEAST SQUARES PROBLEM PROVIDED DECOMPOSITION WITH HOUSEHOLDERS METHOD HAS BEEN CARRIED OUT.
F16ITRPDM  SOLVES WITH ITERATIVE REFINEMENT A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM PROVIDED DECOMPOSITION WITH CHOLESKYS METHOD HAS BEEN CA
           RRIED OUT AND PROVIDES DATA FOR ESTIMATING THE CONDITION NUMBER AND THE NUMBER OF CORRECT DIGITS IN THE FIRST COMPUTED SOLUTION.
F16ITRPDS  SOLVES WITH ITERATIVE REFINEMENT A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM WITH SEVERAL RIGHT-HAND SIDES  PROVIDED DECOMPOSITION WI
           TH CHOLESKYS METHOD HAS BEEN CARRIED OUT AND PROVIDES DATA FOR ESTIMATING THE CONDITION NUMBER AND THE NUMBER OF CORRECT DIGITS IN TH
           E FIRST COMPUTED SOLUTION.
F16ITRSPM  SOLVES WITH ITERATIVE REFINEMENT A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM PROVIDED SQUARE ROOT FREE DECOMPOSITION HAS BEEN CARRIED
            OUT.
F16ITRSPS  SOLVES WITH ITERATIVE REFINEMENT A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM WITH SEVERAL RIGHT-HAND SIDES  PROVIDED SQUARE ROOT FREE
            DECOMPOSITION HAS BEEN CARRIED OUT.
F16LATNTR  CALCULATES THE EIGENVALUES (COMPLEX AND REAL) OF A REAL MATRIX USING HOUSEHOLDERS TRANSFORMATION FOLLOWED BY DOUBLE QR ITERATION.
F16LESWNE  SOLVES A LINEAR SYSTEM USING CROUTS ALGORITHM WITH PARTIAL PIVOTING WITHOUT ROW EQUILIBRATION; THE DETERMINANT IS AVAILABLE.
F16LESWNP  SOLVES A LINEAR SYSTEM USING CROUTS ALGORITHM WITHOUT PIVOTING; THE DETERMINANT IS AVAILABLE.
F16LITWNE  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM USING CROUTS ALGORITHM WITH PARTIAL PIVOTING WITHOUT ROW EQUILIBRATION AND PROVIDES
           DATA FOR ESTIMATING THE DETERMINANT AND CONDITION NUMBER.
F16LITWNP  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM USING CROUTS ALGORITHM WITHOUT PIVOTING AND PROVIDES DATA FOR ESTIMATING THE DETERMI
           NANT AND CONDITION NUMBER.
F16LSQHTM  SOLVES A LINEAR LEAST SQUARES PROBLEM WITH SEVERAL RIGHT-HAND SIDES USING HOUSEHOLDER TRANSFORMATIONS.
F16LSQHTS  SOLVES A LINEAR LEAST SQUARES PROBLEM USING HOUSEHOLDER TRANSFORMATIONS.
F16LSQSIT  SOLVES WITH ITERATIVE REFINEMENT A LINEAR LEAST SQUARES PROBLEM USING HOUSEHOLDERS METHOD.
F16PDITRM  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES USING CHOLESKYS DECOMPOSITION AND PROVIDES DATA FOR
           CALCULATING THE DETERMINANT AND ESTIMATING THE CONDITION NUMBER OF THE MATRIX.
F16PDITRS  SOLVES WITH ITERATIVE REFINEMENT A LINEAR SYSTEM USING CHOLESKY DECOMPOSITION AND PROVIDES DATA FOR CALCULATING THE DETERMINANT AND E
           STIMATING THE CONDITION NUMBER OF THE MATRIX.
F16PDLSOM  SOLVES A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES USING CHOLESKY DECOMPOSITION.
F16PDLSOS  SOLVES A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM USING CHOLESKY DECOMPOSITION.
F16PDSFBM  SOLVES A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES PROVIDED TRIANGULAR DECOMPOSITION USING CHOLESKY D
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	ECOMPOSITION HAS BEEN CARRIED OUT.
F16PDSFBS	SOLVES A SYMMETRIC POSITIVE DEFINITE LINEAR SYSTEM PROVIDED TRIANGULAR DECOMPOSITION USING CHOLESKY DECOMPOSITION HAS BEEN CARRIED OUT.
F16QR1	PERFORMS A SINGLE COMPLEX QR ITERATION ON A HESSENBERG MATRIX HAVING REAL SUBDIAGONAL ELEMENTS.
F16QREIGN	CALCULATES ALL EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX BY MEANS OF QR ITERATION ON A SIMILAR BALANCED HESSENBERG MATRIX.
F16RAYLGH	CALCULATES THE RAYLEIGH QUOTIENT FOR A REAL SYMMETRIC MATRIX.
F16RECOV1	RECOVER EIGENVECTORS AFTER A REDUCTION USING A TRIANGULAR MATRIX IN THE SIMILARITY TRANSFORMATION USED FOR SOLVING THE GENERAL EIGENVALUE PROBLEM.
F16RECOV2	RECOVER EIGENVECTORS AFTER A REDUCTION USING A TRIANGULAR MATRIX IN THE SIMILARITY TRANSFORMATION USED FOR SOLVING THE GENERAL EIGENVALUE PROBLEM.
F16REDSY1	REDUCE THE GENERAL EIGENVALUE PROBLEM TO A STANDARD EIGENVALUE PROBLEM.
F16REDSY2	REDUCE THE GENERAL EIGENVALUE PROBLEM TO A STANDARD EIGENVALUE PROBLEM.
F16SCONG	SOLVES A LINEAR SYSTEM FOR A LARGE SPARSE RECTANGULAR MATRIX USING THE CONJUGATE GRADIENT METHOD.
F16SEPAR2	CALCULATES A SUBSET OF EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX USING THE STURM SEQUENCE PROPERTY OF THE DETERMINANTS OF THE LEADING MINORS.
F16SEPAR	CALCULATES ALL EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX USING THE STURM SEQUENCE PROPERTY OF THE DETERMINANTS OF THE LEADING MINORS.
F16SIMP	PERFORMS THE DESIRED BACK SUBSTITUTION ON THE EIGENVECTORS OF A HESSENBERG MATRIX PROVIDED THE TRANSFORMATION TO HESSEBERG FORM HAS BEEN CARRIED OUT WITH WILKENSONS METHOD.
F16SPDCOM	DECOMPOSES A SYMMETRIC POSITIVE DEFINITE MATRIX INTO LOWER TRIANGULAR, DIAGONAL AND UPPER TRIANGULAR FACTORS WITHOUT CALCULATING A SQUARE ROOT; THE DETERMINANT IS AVAILABLE.
F16SPDFBM	SOLVES A POSITIVE DEFINITE LINEAR SYSTEM PROVIDED THE MATRIX HAS BEEN DECOMPOSED WITHOUT USING THE SQUARE ROOT ROUTINE.
F16SPDFBS	SOLVES A POSITIVE DEFINITE LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES PROVIDED THE MATRIX HAS BEEN DECOMPOSED WITHOUT USING THE SQUARE ROOT ROUTINE.
F16SPDSOM	SOLVES A POSITIVE DEFINITE LINEAR SYSTEM WITHOUT USING THE SQUARE ROOT ROUTINE.
F16SPDSOS	SOLVES A POSITIVE DEFINITE LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES WITHOUT USING THE SQUARE ROOT ROUTINE.
F16SPITRM	SOLVES WITH ITERATIVE REFINEMENT A POSITIVE DEFINITE LINEAR SYSTEM USING SQUARE ROOT FREE DECOMPOSITION.
F16SPITRS	SOLVES WITH ITERATIVE REFINEMENT A POSITIVE DEFINITE LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES USING SQUARE ROOT FREE DECOMPOSITION.
F16SUBDIA	REDUCES A COMPLEX MATRIX TO HESSENBERG FORM USING A MODIFICATION OF HOUSEHOLDERS METHOD.
F16SUBDIR	TRANSFORMS A REAL MATRIX INTO UPPER HESSENBERG FORM ACCORDING TO HOUSEHOLDERS METHOD.
F16SYMLR	CALCULATES ALL EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX USING LR ITERATION.
F16SYMQR	CALCULATES ALL EIGENVALUES OF A SYMMETRIC TRIDIAGONAL MATRIX USING QR ITERATION.
F16TCDIAG	CALCULATES A NUMBER OF EIGENVALUES AND EIGENVECTORS OF A HERMITIAN MATRIX USING HOUSEHOLDERS TRANSFORMATION TO TRIDIAGONAL FORM FOLLOWED BY EITHER QR ITERATION OR LR ITERATION OR THE STURM SEQUENCE METHOD; EIGENVECTORS ARE FOUND BY MEANS OF INVERSE ITERATION.
F16TRDCNP	DECOMPOSES A TRIDIAGONAL MATRIX INTO TRIANGULAR FACTORS WITHOUT PIVOTING.
F16TRDCOM	DECOMPOSES A TRIDIAGONAL MATRIX INTO LOWER AND UPPER TRIANGULAR FACTORS USING PARTIAL PIVOTING.
F16TRDFBM	SOLVES A LINEAR SYSTEM FOR A TRIDIAGONAL MATRIX PROVIDED DECOMPOSITION WITH PARTIAL PIVOTING HAS BEEN CARRIED OUT.
F16TRDSOM	SOLVES A LINEAR SYSTEM FOR A TRIDIAGONAL MATRIX USING PARTIAL PIVOTING.
F16TRDSUB	SOLVES A LINEAR SYSTEM FOR A TRIDIAGONAL MATRIX PROVIDED DECOMPOSITION WITHOUT PIVOTING HAS BEEN CARRIED OUT.
F16TRDWNP	SOLVES A LINEAR SYSTEM FOR A TRIDIAGONAL MATRIX WITHOUT PIVOTING.
F16TRIDI	TRANSFORMS A SYMMETRIC MATRIX INTO TRIDIAGONAL FORM USING HOUSEHOLDERS TRANSFORMATION.
F16TRILOM	SOLVES A LOWER TRIANGULAR LINEAR SYSTEM.
F16TRILOS	SOLVES A LOWER TRIANGULAR LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES.
F16TRIUPM	SOLVES AN UPPER TRIANGULAR LINEAR SYSTEM.
F16TRIUPS	SOLVES AN UPPER TRIANGULAR LINEAR SYSTEM HAVING SEVERAL RIGHT-HAND SIDES.
F16TRLOIN	INVERTS A LOWER TRIANGULAR MATRIX.
F16TRUPIN	INVERTS AN UPPER TRIANGULAR MATRIX.
F16VALVEC	CALCULATES THE EIGENVALUES AND A NUMBER OF EIGENVECTORS OF A COMPLEX MATRIX USING QR ITERATION ON A SIMILAR HESSENBERG MATRIX FOR THE EIGENVALUES AND INVERSE ITERATION FOR THE EIGENVECTORS.
F16VECORD	ORDERS A SET OF COMPLEX NUMBERS ACCORDING TO EITHER DECREASING OR INCREASING MAGNITUDE IN A WAY WHICH IS NOT EFFICIENT FOR A LARGE SET OF NUMBERS.
F16VECTOR	CALCULATES AN EIGENVECTOR BELONGING TO A GOOD APPROXIMATION OF AN EIGENVALUE USING INVERSE ITERATION.
F17BETAR	COMPUTES THE INCOMPLETE BETA RATIO.
F17BRTLTT	PERFORMS BARTLETTS TEST OF THE HOMOGENEITY OF A GROUP OF VARIANCE ESTIMATES.
F17CHIDST	PERFORMS CHI SQUARE TEST FOR GOODNESS OF FIT.
F17CHIPRB	COMPUTES CHI SQUARE CUMULATIVE DISTRIBUTION FUNCTION.
F17CHIRAB	PERFORMS CHI SQUARE TEST FOR SYMMETRY ABOUT ZERO.
F17CHIRUD	PERFORMS CHI SQUARE TEST FOR RUNS UP AND DOWN.
F17CHSQO	COMPUTES CHI SQUARE TEST-STATISTIC FOR GIVEN EXPECTED AND OBSERVED FREQUENCIES.

F17CONRAY	PERFORMS ARITHMETIC OPERATIONS ON THE VALUES OF ONE VARIABLE IN A MULTIPLEXED ARRAY AND A GIVEN CONSTANT.
F17CORCOV	COMPUTES EITHER AUTO CORRELATION COEFFICIENTS OR THE AUTO VARIANCE COEFFICIENTS FOR ONE VARIABLE IN A MULTIPLEXED ARRAY.
F17DLETE	REMOVES SPECIFIED OBSERVATIONS FROM A DATA ARRAY.
F17DSCRP2	COMPUTES MEDIAN, MINIMUM, MAXIMUM, AND RANGE FOR ONE OR ALL VARIABLES IN A MULTIPLEXED ARRAY.
F17DSCRPT	COMPUTES MEANS, STANDARD DEVIATIONS, VARIANCES, AND COEFFICIENTS OF SKEWNESS AND KURTOSIS FOR MULTIPLEXED ARRAYS.
F17EXRAND	GENERATES RANDOM NUMBERS HAVING A NEGATIVE EXPONENTIAL DISTRIBUTION.
F17FILTER	COMPUTES THE OUTPUTS OF A MOVING AVERAGE AUTO REGRESSIVE FILTER.
F17GAMAIN	COMPUTES THE INCOMPLETE GAMMA FUNCTION.
F17HARM	COMPUTES THE FAST FOURIER TRANSFORM OF AN ARRAY OF COMPLEX FOURIER AMPLITUDES.
F17HSTGRM	COMPUTES THE NUMBER OF OBSERVATIONS IN SPECIFIED INTERVALS; USED TO PRODUCE HISTOGRAMS.
F17IRAND	GENERATES UNIFORM RANDOM INTEGERS BETWEEN TWO GIVEN VALUES.
F17NRAND	GENERATES RANDOM NUMBERS HAVING A NORMAL DISTRIBUTION AND STORES THE VALUES IN A MULTIPLEXED ARRAY.
F17NRML	GENERATES RANDOM NUMBERS HAVING A NORMAL DISTRIBUTION.
F17NRMNO	GENERATES RANDOM NUMBERS HAVING A NORMAL DISTRIBUTION, PROVIDING A CONVENIENT WAY OF HANDLING THE TAIL AND STORES THE VALUES IN A MULTIPLEXED ARRAY.
F17OP1RAY	PERFORMS TRANSFORMATIONS ON THE OBSERVATIONS OF ONE VARIABLE IN A MULTIPLEXED ARRAY.
F17OP2RAY	PERFORMS ARITHMETIC TRANSFORMATIONS ON THE OBSERVATIONS OF TWO VARIABLES IN MULTIPLEXED ARRAYS.
F17PBETA	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE BETA DISTRIBUTION.
F17PBINOM	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE BINOMIAL DISTRIBUTION.
F17PCHY	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE CAUCHY DISTRIBUTION.
F17PFDIST	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE F (VARIANCE RATIO) DISTRIBUTION.
F17PGEOM	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE GEOMETRIC DISTRIBUTION.
F17PGMMA	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE GAMMA DISTRIBUTION.
F17PHYPGE	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE HYPER GEOMETRIC DISTRIBUTION.
F17PIBETA	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE BETA DISTRIBUTION.
F17PIBIN	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE BINOMIAL DISTRIBUTION.
F17PICHI	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE CHI SQUARE DISTRIBUTION.
F17PICHY	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE CAUCHY DISTRIBUTION.
F17PIEXP	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE EXPONENTIAL DISTRIBUTION.
F17PIFDIS	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE F (VARIANCE RATIO) DISTRIBUTION.
F17PIGAMA	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE GAMMA DISTRIBUTION.
F17PIGEO	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE GEOMETRIC DISTRIBUTION.
F17PIHYPG	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE HYPER GEOMETRIC DISTRIBUTION.
F17PILGNM	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE LOG NORMAL DISTRIBUTION.
F17PINBIN	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE NEGATIVE BINOMIAL DISTRIBUTION.
F17PINORM	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE NORMAL DISTRIBUTION.
F17PIPOIS	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE POISSON DISTRIBUTION.
F17PIRAYL	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE RAYLEIGH DISTRIBUTION.
F17PITRNM	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE TRUNCATED NORMAL DISTRIBUTION.
F17PIT	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE STUDENTS T DISTRIBUTION.
F17PIUNFD	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE DISCRETE UNIFORM DISTRIBUTION.
F17PIUNF	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE UNIFORM DISTRIBUTION.
F17PIWEBL	COMPUTES THE INVERSE CUMULATIVE DISTRIBUTION FUNCTION OF THE WEIBULL DISTRIBUTION.
F17PLGNRM	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE LOG NORMAL DISTRIBUTION.
F17PNBIN	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE NEGATIVE BINOMIAL DISTRIBUTION.
F17PNORM	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE NORMAL DISTRIBUTION.
F17POIS	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE POISSON DISTRIBUTION.
F17PORAND	GENERATES RANDOM INTEGERS HAVING THE POISSON DISTRIBUTION.
F17PRAYL	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE RAYLEIGH DISTRIBUTION.
F17PRBEXP	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE EXPONENTIAL DISTRIBUTION.
F17PRBUNF	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE UNIFORM DISTRIBUTION.
F17PTDIST	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE STUDENTS T DISTRIBUTION.
F17PTRNRM	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE TRUNCATED NORMAL DISTRIBUTION.
F17PUNFD	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE DISCRETE UNIFORM DISTRIBUTION.
F17PWEBL	COMPUTES THE CUMULATIVE DISTRIBUTION FUNCTION OF THE WEIBULL DISTRIBUTION.
F17RAND	GENERATES RANDOM NUMBERS HAVING UNIFORM OR NORMAL DISTRIBUTION.
F17RUNSAB	COMPUTES THE NUMBER OF RUNS (EXPECTED IN SYMMETRIC DISTRIBUTION AND OBSERVED) ABOVE AND BELOW ZERO OF DIFFERENT LENGTHS FOR A SAMPLE.
F17RUNSUD	COMPUTES THE NUMBER OF RUNS (EXPECTED AND OBSERVED) UP AND DOWN FOR A SAMPLE.
F17SUMPS	COMPUTES THE DOUBLE PRECISION SUMS OF POWERS OF OBSERVATIONS.

F17URAND	GENERATES RANDOM NUMBERS HAVING A UNIFORM DISTRIBUTION AND STORES THE VALUES AS ONE VARIABLE IN A MULTIPLEXED ARRAY,
F17VARORD	SORTS THE VALUES OF ONE VARIABLE IN A MULTIPLEXED ARRAY IN INCREASING ORDER,
F17XIRAND	GENERATES UNIFORM RANDOM FLOATING POINT NUMBERS BETWEEN TWO GIVEN VALUES,
F17XYPLOT	PROVIDES A PRINTER PLOT OF THE VALUES FOR UP TO 5 VARIABLES (ORDINATES) AGAINST A SINGLE VARIABLE (ABSCISSA),
F17YPLOT	PROVIDES A PRINTER PLOT OF THE VALUES FOR UP TO 5 VARIABLES (ORDINATES) IN THEIR STORED ORDER (ABSCISSA),
F17ZRNM	COMPUTES THE VECTOR OF MEANS AND SUBTRACTS THE MEAN FROM EACH OBSERVATION OF A SET,
F18CNSLVL	ESTIMATES THE ROUNDING ERROR IN THE EVALUATION OF A COMPLEX POLYNOMIAL NEAR ONE OF ITS ROOTS THROUGH FORWARD ERROR ANALYSIS,
F18CPOLRT	FINDS ALL THE ZEROS OF A COMPLEX POLYNOMIAL BY APPLYING STEEPEST DESCENT WITH ACCELERATION DEVICES AND USING EXPLICIT DEFLATION WHEN ONE ZERO IS ACCEPTED,
F18HELP	FINDS ALL THE ZEROS OF A COMPLEX POLYNOMIAL BY LEHMERS METHOD USING SCHURS METHOD FOR ISOLATING ONE ZERO,
F18LINSYS	SOLVES A SYSTEM OF LINEAR EQUATIONS OR SEVERAL SYSTEMS WITH THE SAME LEFT HAND SIDE BY GAUSSIAN ELIMINATION USING DOOLITTLES METHOD AND APPLYING PARTIAL PIVOTING AND DOUBLE PRECISION ARITHMETIC FOR THE CALCULATION OF INNER PRODUCTS,
F18MULLP	FINDS ALL THE ZEROS OR A SINGLE ZERO OF A COMPLEX POLYNOMIAL BY MULLERS METHOD WITH DEFLATION,
F18NEWT	SOLVES A SYSTEM OF NONLINEAR EQUATIONS BY COMPUTING IN EACH ITERATION A CORRECTION VECTOR TO THE TRIAL SOLUTION VECTOR WITH THE NEWTON RAPHSON METHOD MODIFYING THIS CORRECTION VECTOR WHEN IT IS TOO LARGE OR WHEN THE CORRECTION DOES NOT IMPROVE THE RESIDUAL OF THE EQUATIONS,
F18NONLIQ	SOLVES A SYSTEM OF NONLINEAR ALGEBRAIC EQUATIONS USING THE GENERALIZED SECANT METHOD MODIFYING THE STEP VECTOR WHEN THE SET OF GUESSES TEND TO BECOME LINEARLY DEPENDENT OR WHEN THE RESIDUALS DO NOT DECREASE,
F18NRSG	SOLVES AN OVER DETERMINED SYSTEM OF NONLINEAR EQUATIONS BY CALCULATING A STEP VECTOR DIRECTION AS A LEAST SQUARES SOLUTION OF THE SYSTEM OF LINEAR EQUATIONS IN THE NEWTON RAPHSON METHOD AND SWITCHING TO THE STEEPEST DESCENT METHOD IF THE FORMER METHOD GIVES DIVERGENCE; IN THE STEP VECTOR DIRECTION THE OPTIMAL STEP VECTOR IS CALCULATED BY PARABOLIC INTERPOLATION,
F18NSLVL	ESTIMATES THE ROUNDING ERROR IN THE EVALUATION OF A POLYNOMIAL WITH REAL COEFFICIENTS NEAR ONE OF ITS COMPLEX ROOTS THROUGH FORWARD ERROR ANALYSIS,
F18PROOT	FINDS ALL ZEROS OF A POLYNOMIAL WITH REAL COEFFICIENTS WITH NEWTONS METHOD OR BAIRSTOWS METHOD BY PERFORMING SIMULTANEOUSLY ONE ITERATION OF EACH METHOD AND DEFLATING THE ORIGINAL POLYNOMIAL WHEN A LINEAR OR QUADRATIC FACTOR IS FOUND,
F18QNWT	SOLVES A SYSTEM OF NONLINEAR EQUATIONS BY USING THE NEWTON RAPHSON METHOD IN THE FIRST ITERATION AND BY UPDATING THE APPROXIMATION OF THE JACOBIAN IN THE NEXT ITERATIONS (QUASI NEWTON METHOD),
F18RQNWT.	SOLVES A SYSTEM OF NONLINEAR EQUATIONS BY CALLING SUBROUTINE QNWT A NUMBER OF TIMES WITH DIFFERENT INITIAL GUESSES,
F18ZAFUJ	FINDS A REQUIRED NUMBER OF ZEROS OF A COMPLEX FUNCTION USING A METHOD DESCRIBED BY JARRATT AND NUDDS FOR APPROXIMATION OF ONE ZERO AND FACTORING OUT PREVIOUSLY FOUND ZEROS,
F18ZAFUM	FINDS A REQUIRED NUMBER OF ZEROS OF A COMPLEX FUNCTION WITH MULLERS METHOD AND FACTORING OUT PREVIOUSLY FOUND ZEROS,
F18ZAFUR	FINDS A REQUIRED NUMBER OF REAL ZEROS OF A REAL FUNCTION WITH A METHOD DESCRIBED BY JARRATT AND NUDDS FOR APPROXIMATION OF ONE ZERO AND FACTORING OUT PREVIOUSLY FOUND ZEROS.
F18ZCOUNT	CALCULATES THE NUMBER OF ZEROS, DECREASED BY THE NUMBER OF POLES, OF A COMPLEX FUNCTION IN AN AREA IN THE COMPLEX PLANE ENCLOSED BY A POLYGON.