SUBJECT WISE LIST OF FORTRAN SUBPROGRAMS

Chapter 2 Roundoff Error

CASSUM	Cascade sum of a finite series using a function to calculate the terms
CASSUM_A	Cascade sum of a finite series using an array to supply the terms
ROUND	Rounding a floating-point number to a specified number of digits

Chapter 3 Linear Algebraic Equations

GAUELM	Solve a system of linear equations using Gaussian elimination
GAUELM_C	Solve a system of linear equations using Gaussian elimination (complex version)
MATINV	Calculate inverse of a square matrix using Gaussian elimination
CROUT	Solve a system of linear equations using Crout's algorithm
CROUT_C	Solve a system of linear equations using Crout's algorithm (complex version)
CROUTH	Iterative refinement of solution of a system of linear equations
CHOLSK	Solve a system of linear equations with symmetric positive definite matrix using Cholesky's decomposition
GAUBND	Solve a system of linear equations with a band matrix using Gaussian elimination with partial pivoting
GAUBND_C	Solve a system of linear equations with a band matrix using Gaussian elimination with partial pivoting (complex version)
SVD	Singular value decomposition of a matrix
SVDEVL	Solve a system of linear equations using singular value decomposition

Chapter 4 Interpolation

DIVDIF	Calculate interpolation and its derivatives using divided difference formula
DIVDIF0	Divided difference interpolation formula (no derivatives version)
NEARST	Find nearest point in an ordered table using bisection
SPLINE	Calculate coefficients of interpolating cubic spline
SPLEVL	Evaluate the cubic spline and its derivatives at a specified point
SMOOTH	Draw a smooth curve through a set of points using cubic spline
BSPLIN	Calculate B-spline basis functions on a set of knots
BSPINT	Calculate coefficients of B-spline interpolation
BSPEVL	Evaluate function value and its derivatives using B-spline expansion

RATNAL	Calculate rational function interpolation
POLY2	Calculate polynomial interpolation in two dimensions
LINRN	Calculate linear interpolation in n dimensions
LOCATE	Find the bracketing subinterval in an ordered table
BSPINT2	Calculate coefficients of B-spline interpolation in two dimensions
BSPEV2	Evaluate function value and derivatives using B-spline expansion in two dimensions
BSPINTN	Calculate coefficients of B-spline interpolation in n dimensions
BSPEVN	Evaluate function value using B-spline expansion in n dimensions
BSPEVN1	Evaluate function value and first derivative using B-spline expansion in n dimensions
BSPEVN2	Evaluate function value and first and second derivatives using B-spline expansion in n dimensions

Chapter 5 Differentiation

DRVT	Differentiation using $h \to 0$ extrapolation

Chapter 6 Integration

SIMSON	Integration using Simpson's 1/3 rule
SPLINT	Integrate a tabulated function using cubic spline
BSPQD	Integrate a B-spline expansion
ROMBRG	Romberg integration
EPSILN	Integration using ϵ-algorithm
GAUSS	Integration using Gauss-Legendre formula
GAUCBY	Integration using Gauss-Chebyshev formula with weight function, $w(x) = 1/\sqrt{(x-A)(B-x)}$
GAUCB1	Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)/(B-x)}$
GAUCB2	Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)(B-x)}$
GAUSQ2	Integration over $(0, A]$ with square root singularity using a combination of Gaussian formulae
GAUSQ	Integration over $(0, A]$ using Gaussian formula with weight function, $w(x) = 1/\sqrt{x}$
GAULAG	Integration over $[A, \infty)$ using a combination of Gaussian formulae
LAGURE	Integration over $[A, \infty)$ using Gauss-Laguerre formula
HERMIT	Integration over $(-\infty, \infty)$ using Gauss-Hermite formula
GAULG2	Integration over $(0, A]$ with logarithmic singularity using a combination of Gaussian formulae
GAULOG	Integration over $(0, A]$ using Gaussian formula with weight function, $w(x) = \ln(A/x)$
GAUSRC	Calculate weights and abscissas of Gaussian formula using recurrence relation of orthogonal polynomials
GAULEG	Calculate weights and abscissas of Gauss-Legendre quadrature formulae

GAUJAC	Calculate weights and abscissas of Gauss-Jacobi quadrature formulae
LAGURW	Calculate weights and abscissas of Gauss-Laguerre quadrature formulae
GAUHER	Calculate weights and abscissas of Gauss-Hermite quadrature formulae
GAUSWT	Calculate weights and abscissas of Gaussian formula using moments of weight function
FILON	Integration of an oscillatory function using Filon's formula
ADPINT	Adaptive integration over a finite interval
KRONRD	Integration using Gauss-Kronrod formula for use with ADPINT
GAUS16	Integration using 16 point Gauss-Legendre formula for use with ADPINT
CAUCHY	Calculate Cauchy principal value of an integral
EULER	Summation of alternating series using Euler transformation
BSPQD2	Integrate a B-spline expansion in two dimensions
BSPQDN	Integrate a B-spline expansion in n dimensions
MULINT	Multiple integration using product Gauss rule with varying number of points
NGAUSS	Multiple integration using a specified product Gauss rule
SPHND	To convert from hyper-spherical coordinates to Cartesian coordinates
STRINT	Multiple integration using monomial rules with varying number of points
STROUD	Multiple integration using a specified monomial rule
MCARLO	Multiple integration using Monte Carlo method
RAN1	Generate a sequence of random numbers with uniform distribution
RANF	Generate a sequence of random numbers with uniform distribution
EQUIDS	Multiple integration using equidistributed sequences

Chapter 7 Nonlinear Algebraic Equations

BISECT	Solve a nonlinear equation using bisection
SECANT	Solve a nonlinear equation using secant iteration
SECAN_2	Solve a nonlinear equation using secant iteration with function in scaled form $(f(x) = F(x)2^{i(x)})$
SECANC	Complex roots of a nonlinear equation using secant iteration
SECANC_2	Complex roots of a nonlinear equation using secant iteration with function in scaled form $(f(x) = F(x)2^{i(x)})$
SECANI	Solve a nonlinear equation using secant iteration (with reverse communication)
NEWRAP	Solve a nonlinear equation using Newton-Raphson method
BRENT	Solve a nonlinear equation using Brent's method
SEARCH	Locate complex zeros by looking for sign changes
ZROOT	Complex roots of a nonlinear equation with deflation
ZROOT2	Complex roots of a nonlinear equation with deflation, function value in scaled form, $f(x) \times 2^{i(x)}$
MULLER	Complex root using Muller's method
MULER2	Complex root using Muller's method with function value in a scaled form, $f(x) \times 2^{i(x)}$
DELVES	Complex zeros of an analytic function using quadrature based method
CONTUR	Contour integration over a circular contour for DELVES

NEWRAC	Complex root of a nonlinear equation using Newton-Raphson method
POLYR	All roots of a polynomial with real coefficients
LAGITR	One root of a polynomial with real coefficients using Laguerre's method
POLYC	All roots of a polynomial with complex coefficients
LAGITC	One root of a polynomial with complex coefficients using Laguerre's method
DAVIDN	Solve a system of nonlinear equations using Davidenko's method coupled with Newton's method
DAVIDN_B	Solve a system of nonlinear equations using Davidenko's method coupled with Broyden's method
NEWTON	Solve a system of nonlinear equations using Newton's method
BROYDN	Solve a system of nonlinear equations using Broyden's method

Chapter 8 Optimisation

BRACKM	Bracketing a minimum in one dimension
GOLDEN	Minimisation in one dimension using golden section search
BRENTM	Minimisation in one dimension using Brent's method
DAVIDM	Minimisation in one dimension using cubic Hermite interpolation
BFGS	Minimisation in n dimensions using quasi-Newton method with BFGS formula
LINMIN	Line search for quasi-Newton method
FLNM	Calculate the function value for line search for quasi-Newton method
NMINF	Minimisation in n dimensions using direction set method
LINMNF	Line search for direction set method
FLN	Calculate the function value for line search for direction set method
SIMPLX	Solving a linear programming problem using simplex method
SIMPX	Simplex method for a linear programming problem in the standard form

Chapter 9 Statistical Inferences

SHSORT	Sorting an array in ascending order using shell sort algorithm
GAMMAP	Calculate incomplete Gamma function
BETAP	Calculate incomplete Beta function
BETSER	Calculate incomplete Beta function using a power series approximation
BETCON1	Calculate incomplete Beta function using a continued fraction approximation
BETCON	Calculate incomplete Beta function using an alternative continued fraction approximation
BETAI	Calculate incomplete Beta function by directly evaluating the integral
FBETA	Calculate the integrand for BETAI
RANGAU	Generate a sequence of random numbers with Gaussian distribution
IRANBIN	Generate a sequence of random numbers with binomial distribution
IRANPOI	Generate a sequence of random numbers with Poisson distribution
PCOR	Calculate the probability that two uncorrelated sequences will give a correlation coefficient exceeding a given value

Chapter 10 Functional Approximations

POLFIT	Least squares polynomial fit using orthogonal polynomials
POLEVL	Evaluate the fitted polynomial and its derivatives at a specified point
POLFIT1	Least squares polynomial fit using orthogonal polynomials, simplified version for multiple data sets
POLORT	Evaluate the orthogonal polynomial basis functions at a given point
POLFIT2	Least squares polynomial fit using orthogonal polynomials in two dimensions
POLEV2	Evaluate the fitted polynomial and its derivatives at a specified point in two dimensions
POLFITN	Least squares polynomial fit using orthogonal polynomials in n dimensions
POLEVN	Evaluate the fitted polynomial at a specified point in n dimensions
POLEVN1	Evaluate the fitted polynomial and first derivative at a specified point in n dimensions
POLEVN2	Evaluate the fitted polynomial and first and second derivatives at a specified point in n dimensions
LLSQ	Linear least squares fit in n dimensions to a user defined set of basis functions
BSPFIT	Least squares fit to B-spline basis functions in one dimension
BSPFIT2	Least squares fit to B-spline basis in two dimensions with equal weights
BSPFITW2	Least squares fit to B-spline basis in two dimensions with arbitrary weights
BSPFITN	Least squares fit to B-spline basis in n dimensions with equal weights
BSPFITWN	Least squares fit to B-spline basis in n dimensions with arbitrary weights
LINFITXY	Least squares straight line fit when there are errors in both x and y values
NLLSQ	Calculate the Chi square function for a nonlinear least squares fit using quasi Newton method (BFGS)
NLLSQ_F	Calculate the Chi square function for a nonlinear least squares fit using direction set method (NMINF)
DFT	Discrete Fourier transform of complex data with arbitrary number of points
FFT	Fast Fourier transform of complex data
FFTR	Fast Fourier transform of real data
FFTN	Fast Fourier transform of complex data in n dimensions
LAPINV	Inverse Laplace transform
POLD	Evaluate a polynomial and its derivative at any point
RMK	Evaluate a rational function at any point
RMK1	Evaluate a rational function at any point (constant term in denominator 1)
RMKD	Evaluate a rational function and its derivative at any point
RMKD1	Evaluate a rational function and its derivative at any point (constant term in denominator 1)
PADE	Calculate coefficients of Padé approximations
CHEBCF	Convert from power series to Chebyshev expansion and vice versa
CHEBEX	Calculate the coefficients of Chebyshev expansion
CHEBAP	Rational function approximation using Chebyshev polynomials
REMES	Minimax approximation to mathematical functions using Remes algorithm
FM	Calculate error in rational function approximation for use with REMES
GAMMA	Calculate Gamma function at real x, $\Gamma(x)$

GAMMAL	Calculate natural logarithm of Gamma function at real x, $\ln\|\Gamma(x)\|$
ERF	Calculate Error function at real x
ERFC	Calculate complementary Error function at real x
BJ0	Calculate Bessel function of first kind of order zero, $J_0(x)$
BJ1	Calculate Bessel function of first kind of order one, $J_1(x)$
BJN	Calculate Bessel function of first kind of integral order, $J_n(x)$
BY0	Calculate Bessel function of second kind of order zero, $Y_0(x)$
BJY0	Calculate Bessel function of first and second kind of order zero
BY1	Calculate Bessel function of second kind of order one, $Y_1(x)$
BJY1	Calculate Bessel function of first and second kind of order one
BYN	Calculate Bessel function of second kind of integral order, $Y_n(x)$
SPHBJN	Calculate spherical Bessel function of integral order, $j_n(x)$
BI0	Calculate modified Bessel function of first kind of order zero, $I_0(x)$
BI1	Calculate modified Bessel function of first kind of order one, $I_1(x)$
BIN	Calculate modified Bessel function of first kind of integral order, $I_n(x)$
BK0	Calculate modified Bessel function of second kind of order zero, $K_0(x)$
BK1	Calculate modified Bessel function of second kind of order one, $K_1(x)$
BKN	Calculate modified Bessel function of second kind of integral order, $K_n(x)$
DAWSON	Calculate the value of Dawson's integral
FERMM05	Calculate the Fermi integrals for $k = -1/2$
FERM05	Calculate the Fermi integrals for $k = 1/2$
FERM15	Calculate the Fermi integrals for $k = 3/2$
FERM25	Calculate the Fermi integrals for $k = 5/2$
PLEG	Calculate the Legendre polynomial, $P_\ell(x)$
PLM	Calculate the associated Legendre function, $P_\ell^m(x)$
YLM	Calculate the spherical harmonic, $Y_\ell^m(\theta, \phi)$
YLM_X	Calculate the spherical harmonic, $Y_\ell^m(\cos\theta, \phi)$
MINMAX	Rational function minimax approximation to discrete data
POLYL1	Polynomial L_1-approximation to discrete data
LINL1	Linear L_1-approximation to discrete data for arbitrary basis functions
SIMPL1	Modified simplex method for LP problems in L_1-approximation

Chapter 11 Algebraic Eigenvalue Problem

INVIT	Real eigenvalue and eigenvector of a real matrix using inverse iteration
INVIT_L	Real eigenvalue and left-eigenvector of a real matrix using inverse iteration
INVIT_C	Complex eigenvalue and eigenvector of a real matrix using inverse iteration
INVIT_CL	Complex eigenvalue and left-eigenvector of a real matrix using inverse iteration
INVIT_CC	Complex eigenvalue and eigenvector of a complex matrix using inverse iteration
TRED2	Reduction of a real symmetric matrix to symmetric tridiagonal form using Householder transformations
TRBAK	Back-transform eigenvectors of tridiagonal matrix to original matrix
TQL2	Eigenvalue problem for a symmetric tridiagonal matrix using QL-algorithm

TRIDIA	Specified eigenvalues and eigenvectors of a symmetric tridiagonal matrix using Sturm sequence and inverse iteration
STURM	Locate eigenvalues of a symmetric tridiagonal matrix using Sturm sequence
TINVIT	Eigenvalue and eigenvector of a symmetric tridiagonal matrix using inverse iteration
HEREVP	Eigenvalue problem for a complex Hermitian matrix
BALANC	Balancing a general real matrix
BALBAK	Back-transform eigenvectors of balanced matrix to original matrix
BALBAK_L	Back-transform left-eigenvectors of balanced matrix to original matrix
ELMHES	Reduce a real matrix to Hessenberg form using Gaussian elimination
HQR	Eigenvalues of a Hessenberg matrix using QR-algorithm

Chapter 12 Ordinary Differential Equations

RKM	Initial value problem using fourth-order Runge-Kutta method with adaptive step size
RKM_2	Initial value problem using second-order Runge-Kutta method with adaptive step size
RK4	One step of integration using fourth-order Runge-Kutta method
RK2	One step of integration using second-order Runge-Kutta method
MSTEP	Initial value problem using predictor-corrector method with adaptive step size
ADAMS	One step of integration using fourth-order Adams method
STRT4	Starting values for multistep method using Runge-Kutta method
GEAR	One step of integration using fourth-order stiffly stable method
EXTP	Initial value problem using extrapolation method
FDM	Two-point boundary value problem using finite difference method
GEVP	Eigenvalue problem in differential equations using finite differences
GEVP_C	Eigenvalue problem in differential equations using finite differences (complex version)
GAUBLK	Solve a system of linear equations involving finite difference matrix
GAUBLK_C	Solve a system of linear equations involving finite difference matrix (complex version)
SETMAT	Generate finite difference matrix for a system of differential equations
SETMAT_C	Generate finite difference matrix for a system of differential equations (complex version)
BSPODE	Two-point boundary value problem using expansion method with B-spline basis functions

Chapter 13 Integral Equations

FRED	Solve a Fredholm equation using quadrature method
FREDCO	Solve a Fredholm equation using collocation method
FUNK	Integrand = $K(x,t)\phi_j(t)$, for evaluating integrals in collocation method
RLS	Solve a linear inversion problem using regularised least squares technique
FORW	Solve the forward problem

VOLT	Solve a linear Volterra equation using trapezoidal rule
VOLT2	Solve a nonlinear Volterra equation of the second kind using Simpson's rule

Chapter 14 Partial Differential Equations

CRANK	Linear second-order parabolic equation using Crank-Nicolson method
LINES	Nonlinear parabolic equations using the method of lines
ADM	Parabolic equation in two space variables using alternating direction method
LAX	Nonlinear hyperbolic equations using the Lax-Wendroff method
SOR	Linear second-order elliptic equations using the successive over-relaxation (SOR) method
ADI	Linear second-order elliptic equations using the alternating direction implicit iterative (ADI) method

ALPHABETIC LIST OF FORTRAN SUBPROGRAMS

ADAMS	One step of integration using fourth-order Adams method
ADI	Linear second-order elliptic equations using the alternating direction implicit iterative (ADI) method
ADM	Parabolic equation in two space variables using alternating direction method
ADPINT	Adaptive integration over a finite interval
BALANC	Balancing a general real matrix
BALBAK	Back-transform eigenvectors of balanced matrix to original matrix
BALBAK_L	Back-transform left-eigenvectors of balanced matrix to original matrix
BETAI	Calculate incomplete Beta function by directly evaluating the integral
BETAP	Calculate incomplete Beta function
BETCON1	Calculate incomplete Beta function using a continued fraction approximation
BETCON	Calculate incomplete Beta function using an alternative continued fraction approximation
BETSER	Calculate incomplete Beta function using a power series approximation
BFGS	Minimisation in n dimensions using quasi-Newton method with BFGS formula
BI0	Calculate modified Bessel function of first kind of order zero, $I_0(x)$
BI1	Calculate modified Bessel function of first kind of order one, $I_1(x)$
BIN	Calculate modified Bessel function of first kind of integral order, $I_n(x)$
BISECT	Solve a nonlinear equation using bisection
BJ0	Calculate Bessel function of first kind of order zero, $J_0(x)$
BJ1	Calculate Bessel function of first kind of order one, $J_1(x)$
BJN	Calculate Bessel function of first kind of integral order, $J_n(x)$
BJY0	Calculate Bessel function of first and second kind of order zero
BJY1	Calculate Bessel function of first and second kind of order one
BK0	Calculate modified Bessel function of second kind of order zero, $K_0(x)$
BK1	Calculate modified Bessel function of second kind of order one, $K_1(x)$
BKN	Calculate modified Bessel function of second kind of integral order, $K_n(x)$
BRACKM	Bracketing a minimum in one dimension
BRENTM	Minimisation in one dimension using Brent's method
BRENT	Solve a nonlinear equation using Brent's method
BROYDN	Solve a system of nonlinear equations using Broyden's method

BSPEV2	Evaluate function value and derivatives using B-spline expansion in two dimensions
BSPEVL	Evaluate function value and its derivatives using B-spline expansion
BSPEVN	Evaluate function value using B-spline expansion in n dimensions
BSPEVN1	Evaluate function value and first derivative using B-spline expansion in n dimensions
BSPEVN2	Evaluate function value and first and second derivatives using B-spline expansion in n dimensions
BSPFIT	Least squares fit to B-spline basis functions in one dimension
BSPFIT2	Least squares fit to B-spline basis in two dimensions with equal weights
BSPFITN	Least squares fit to B-spline basis in n dimensions with equal weights
BSPFITW2	Least squares fit to B-spline basis in two dimensions with arbitrary weights
BSPFITWN	Least squares fit to B-spline basis in n dimensions with arbitrary weights
BSPINT	Calculate coefficients of B-spline interpolation
BSPINT2	Calculate coefficients of B-spline interpolation in two dimensions
BSPINTN	Calculate coefficients of B-spline interpolation in n dimensions
BSPLIN	Calculate B-spline basis functions on a set of knots
BSPODE	Two-point boundary value problem using expansion method with B-spline basis functions
BSPQD	Integrate a B-spline expansion
BSPQD2	Integrate a B-spline expansion in two dimensions
BSPQDN	Integrate a B-spline expansion in n dimensions
BY0	Calculate Bessel function of second kind of order zero, $Y_0(x)$
BY1	Calculate Bessel function of second kind of order one, $Y_1(x)$
BYN	Calculate Bessel function of second kind of integral order, $Y_n(x)$
CASSUM	Cascade sum of a finite series using a function to calculate the terms
CASSUM_A	Cascade sum of a finite series using an array to supply the terms
CAUCHY	Calculate Cauchy principal value of an integral
CHEBAP	Rational function approximation using Chebyshev polynomials
CHEBCF	Convert from power series to Chebyshev expansion and vice versa
CHEBEX	Calculate the coefficients of Chebyshev expansion
CHOLSK	Solve a system of linear equations with symmetric positive definite matrix using Cholesky's decomposition
CONTUR	Contour integration over a circular contour for DELVES
CRANK	Linear second-order parabolic equation using Crank-Nicolson method
CROUT	Solve a system of linear equations using Crout's algorithm
CROUT_C	Solve a system of linear equations using Crout's algorithm (complex version)
CROUTH	Iterative refinement of solution of a system of linear equations
DAVIDM	Minimisation in one dimension using cubic Hermite interpolation
DAVIDN	Solve a system of nonlinear equations using Davidenko's method coupled with Newton's method
DAVIDN_B	Solve a system of nonlinear equations using Davidenko's method coupled with Broyden's method

DAWSON	Calculate the value of Dawson's integral
DELVES	Complex zeros of an analytic function using quadrature based method
DFT	Discrete Fourier transform of complex data with arbitrary number of points
DIVDIF	Calculate interpolation and its derivatives using divided difference formula
DIVDIF0	Divided difference interpolation formula (no derivatives version)
DRVT	Differentiation using $h \to 0$ extrapolation
ELMHES	Reduce a real matrix to Hessenberg form using Gaussian elimination
EPSILN	Integration using ϵ-algorithm
EQUIDS	Multiple integration using equidistributed sequences
ERF	Calculate Error function at real x
ERFC	Calculate complementary Error function at real x
EULER	Summation of alternating series using Euler transformation
EXTP	Initial value problem using extrapolation method
FBETA	Calculate the integrand for BETAI
FDM	Two-point boundary value problem using finite difference method
FERM05	Calculate the Fermi integrals for $k = 1/2$
FERM15	Calculate the Fermi integrals for $k = 3/2$
FERM25	Calculate the Fermi integrals for $k = 5/2$
FERMM05	Calculate the Fermi integrals for $k = -1/2$
FFT	Fast Fourier transform of complex data
FFTN	Fast Fourier transform of complex data in n dimensions
FFTR	Fast Fourier transform of real data
FILON	Integration of an oscillatory function using Filon's formula
FLN	Calculate the function value for line search for direction set method
FLNM	Calculate the function value for line search for quasi-Newton method
FM	Calculate error in rational function approximation for use with REMES
FORW	Solve the forward problem
FRED	Solve a Fredholm equation using quadrature method
FREDCO	Solve a Fredholm equation using collocation method
FUNK	Integrand $= K(x,t)\phi_j(t)$, for evaluating integrals in collocation method
GAMMAL	Calculate natural logarithm of Gamma function at real x, $\ln\lvert\Gamma(x)\rvert$
GAMMA	Calculate Gamma function at real x, $\Gamma(x)$
GAMMAP	Calculate incomplete Gamma function
GAUBLK	Solve a system of linear equations involving finite difference matrix
GAUBLK_C	Solve a system of linear equations involving finite difference matrix (complex version)
GAUBND	Solve a system of linear equations with a band matrix using Gaussian elimination with partial pivoting
GAUBND_C	Solve a system of linear equations with a band matrix using Gaussian elimination with partial pivoting (complex version)

GAUCB1	Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)/(B-x)}$
GAUCB2	Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)(B-x)}$
GAUCBY	Integration using Gauss-Chebyshev formula with weight function, $w(x) = 1/\sqrt{(x-A)(B-x)}$
GAUELM	Solve a system of linear equations using Gaussian elimination
GAUELM_C	Solve a system of linear equations using Gaussian elimination (complex version)
GAUHER	Calculate weights and abscissas of Gauss-Hermite quadrature formulae
GAUJAC	Calculate weights and abscissas of Gauss-Jacobi quadrature formulae
GAULAG	Integration over $[A, \infty)$ using a combination of Gaussian formulae
GAULEG	Calculate weights and abscissas of Gauss-Legendre quadrature formulae
GAULG2	Integration over $(0, A]$ with logarithmic singularity using a combination of Gaussian formulae
GAULOG	Integration over $(0, A]$ using Gaussian formula with weight function, $w(x) = \ln(A/x)$
GAUS16	Integration using 16 point Gauss-Legendre formula for use with ADPINT
GAUSQ	Integration over $(0, A]$ using Gaussian formula with weight function, $w(x) = 1/\sqrt{x}$
GAUSQ2	Integration over $(0, A]$ with square root singularity using a combination of Gaussian formulae
GAUSRC	Calculate weights and abscissas of Gaussian formula using recurrence relation of orthogonal polynomials
GAUSS	Integration using Gauss-Legendre formula
GAUSWT	Calculate weights and abscissas of Gaussian formula using moments of weight function
GEAR	One step of integration using fourth-order stiffly stable method
GEVP	Eigenvalue problem in differential equations using finite differences
GEVP_C	Eigenvalue problem in differential equations using finite differences (complex version)
GOLDEN	Minimisation in one dimension using golden section search
HEREVP	Eigenvalue problem for a complex Hermitian matrix
HERMIT	Integration over $(-\infty, \infty)$ using Gauss-Hermite formula
HQR	Eigenvalues of a Hessenberg matrix using QR-algorithm
INVIT	Real eigenvalue and eigenvector of a real matrix using inverse iteration
INVIT_C	Complex eigenvalue and eigenvector of a real matrix using inverse iteration
INVIT_CC	Complex eigenvalue and eigenvector of a complex matrix using inverse iteration
INVIT_CL	Complex eigenvalue and left-eigenvector of a real matrix using inverse iteration
INVIT_L	Real eigenvalue and left-eigenvector of a real matrix using inverse iteration
IRANBIN	Generate a sequence of random numbers with binomial distribution
IRANPOI	Generate a sequence of random numbers with Poisson distribution

KRONRD	Integration using Gauss-Kronrod formula for use with ADPINT
LAGITC	One root of a polynomial with complex coefficients using Laguerre's method
LAGITR	One root of a polynomial with real coefficients using Laguerre's method
LAGURE	Integration over $[A, \infty)$ using Gauss-Laguerre formula
LAGURW	Calculate weights and abscissas of Gauss-Laguerre quadrature formulae
LAPINV	Inverse Laplace transform
LAX	Nonlinear hyperbolic equations using the Lax-Wendroff method
LINES	Nonlinear parabolic equations using the method of lines
LINFITXY	Least squares straight line fit when there are errors in both x and y values
LINL1	Linear L_1-approximation to discrete data for arbitrary basis functions
LINMIN	Line search for quasi-Newton method
LINMNF	Line search for direction set method
LINRN	Calculate linear interpolation in n dimensions
LLSQ	Linear least squares fit in n dimensions to a user defined set of basis functions
LOCATE	Find the bracketing subinterval in an ordered table
MATINV	Calculate inverse of a square matrix using Gaussian elimination
MCARLO	Multiple integration using Monte Carlo method
MINMAX	Rational function minimax approximation to discrete data
MSTEP	Initial value problem using predictor-corrector method with adaptive step size
MULER2	Complex root using Muller's method with function value in a scaled form, $f(x) \times 2^{i(x)}$
MULINT	Multiple integration using product Gauss rule with varying number of points
MULLER	Complex root using Muller's method
NEARST	Find nearest point in an ordered table using bisection
NEWRAC	Complex root of a nonlinear equation using Newton-Raphson method
NEWRAP	Solve a nonlinear equation using Newton-Raphson method
NEWTON	Solve a system of nonlinear equations using Newton's method
NGAUSS	Multiple integration using a specified product Gauss rule
NLLSQ	Calculate the Chi square function for a nonlinear least squares fit using quasi Newton method (BFGS)
NLLSQ_F	Calculate the Chi square function for a nonlinear least squares fit using direction set method (NMINF)
NMINF	Minimisation in n dimensions using direction set method
PADE	Calculate coefficients of Padé approximations
PCOR	Calculate the probability that two uncorrelated sequences will give a correlation coefficient exceeding a given value
PLEG	Calculate the Legendre polynomial, $P_\ell(x)$
PLM	Calculate the associated Legendre function, $P_\ell^m(x)$
POLD	Evaluate a polynomial and its derivative at any point

POLEV2	Evaluate the fitted polynomial and its derivatives at a specified point in two dimensions
POLEVL	Evaluate the fitted polynomial and its derivatives at a specified point
POLEVN	Evaluate the fitted polynomial at a specified point in n dimensions
POLEVN1	Evaluate the fitted polynomial and first derivative at a specified point in n dimensions
POLEVN2	Evaluate the fitted polynomial and first and second derivatives at a specified point in n dimensions
POLFIT	Least squares polynomial fit using orthogonal polynomials
POLFIT1	Least squares polynomial fit using orthogonal polynomials, simplified version for multiple data sets
POLFIT2	Least squares polynomial fit using orthogonal polynomials in two dimensions
POLFITN	Least squares polynomial fit using orthogonal polynomials in n dimensions
POLORT	Evaluate the orthogonal polynomial basis functions at a given point
POLY2	Calculate polynomial interpolation in two dimensions
POLYC	All roots of a polynomial with complex coefficients
POLYL1	Polynomial L_1-approximation to discrete data
POLYR	All roots of a polynomial with real coefficients
RAN1	Generate a sequence of random numbers with uniform distribution
RANF	Generate a sequence of random numbers with uniform distribution
RANGAU	Generate a sequence of random numbers with Gaussian distribution
RATNAL	Calculate rational function interpolation
REMES	Minimax approximation to mathematical functions using Remes algorithm
RK2	One step of integration using second-order Runge-Kutta method
RK4	One step of integration using fourth-order Runge-Kutta method
RKM	Initial value problem using fourth-order Runge-Kutta method with adaptive step size
RKM_2	Initial value problem using second-order Runge-Kutta method with adaptive step size
RLS	Solve a linear inversion problem using regularised least squares technique
RMK	Evaluate a rational function at any point
RMK1	Evaluate a rational function at any point (constant term in denominator 1)
RMKD	Evaluate a rational function and its derivative at any point
RMKD1	Evaluate a rational function and its derivative at any point (constant term in denominator 1)
ROMBRG	Romberg integration
ROUND	Rounding a floating-point number to a specified number of digits
SEARCH	Locate complex zeros by looking for sign changes
SECANC	Complex roots of a nonlinear equation using secant iteration
SECANC_2	Complex roots of a nonlinear equation using secant iteration with function in scaled form ($f(x) = F(x)2^{i(x)}$)
SECANI	Solve a nonlinear equation using secant iteration (with reverse communication)

SECANT	Solve a nonlinear equation using secant iteration
SECAN_2	Solve a nonlinear equation using secant iteration with function in scaled form ($f(x) = F(x)2^{i(x)}$)
SETMAT	Generate finite difference matrix for a system of differential equations
SETMAT_C	Generate finite difference matrix for a system of differential equations (complex version)
SHSORT	Sorting an array in ascending order using shell sort algorithm
SIMPL1	Modified simplex method for LP problems in L_1-approximation
SIMPLX	Solving a linear programming problem using simplex method
SIMPX	Simplex method for a linear programming problem in the standard form
SIMSON	Integration using Simpson's 1/3 rule
SMOOTH	Draw a smooth curve through a set of points using cubic spline
SOR	Linear second-order elliptic equations using the successive over-relaxation (SOR) method
SPHBJN	Calculate spherical Bessel function of integral order, $j_n(x)$
SPHND	To convert from hyper-spherical coordinates to Cartesian coordinates
SPLEVL	Evaluate the cubic spline and its derivatives at a specified point
SPLINE	Calculate coefficients of interpolating cubic spline
SPLINT	Integrate a tabulated function using cubic spline
STRINT	Multiple integration using monomial rules with varying number of points
STROUD	Multiple integration using a specified monomial rule
STRT4	Starting values for multistep method using Runge-Kutta method
STURM	Locate eigenvalues of a symmetric tridiagonal matrix using Sturm sequence
SVD	Singular value decomposition of a matrix
SVDEVL	Solve a system of linear equations using singular value decomposition
TINVIT	Eigenvalue and eigenvector of a symmetric tridiagonal matrix using inverse iteration
TQL2	Eigenvalue problem for a symmetric tridiagonal matrix using QL-algorithm
TRBAK	Back-transform eigenvectors of tridiagonal matrix to original matrix
TRED2	Reduction of a real symmetric matrix to symmetric tridiagonal form using Householder transformations
TRIDIA	Specified eigenvalues and eigenvectors of a symmetric tridiagonal matrix using Sturm sequence and inverse iteration
VOLT	Solve a linear Volterra equation using trapezoidal rule
VOLT2	Solve a nonlinear Volterra equation of the second kind using Simpson's rule
YLM	Calculate the spherical harmonic, $Y_\ell^m(\theta, \phi)$
YLM_X	Calculate the spherical harmonic, $Y_\ell^m(\cos\theta, \phi)$
ZROOT	Complex roots of a nonlinear equation with deflation
ZROOT2	Complex roots of a nonlinear equation with deflation, function value in scaled form, $f(x) \times 2^{i(x)}$