SUBJECT WISE LIST OF FORTRAN EXAMPLES

List of all examples giving the list of subprograms used in each example

Chapter 2 Roundoff Error

SUM	Cascade sum of a finite series using a function to calculate the terms (Example 2.2) CASSUM
SUM_A	Cascade sum of a finite series using an array to supply the terms (Example 2.2) CASSUM_A
ROUND	Rounding a floating-point number to a specified number of digits ROUND

Chapter 3 Linear Algebraic Equations

LINEAR	Solve a system of linear equations using Gaussian elimination/ Crout's algorithm/ iterative refinement/ Cholesky decomposition/ singular value decomposition (Example 3.5) CHOLSK, CROUT, CROUTH, GAUELM, SVD, SVDEVL
MATINV	Inverse of a real matrix using Gaussian elimination GAUELM, MATINV
GAUBND	Solve a system of linear equation for a band matrix using Gaussian elimination GAUBND, RAN1
CMAT	Inverse of a complex band matrix using Gaussian elimination GAUBND_C, RAN1

Chapter 4 Interpolation

INTERP	Interpolation in one dimension (polynomial/ spline/ B-spline/ rational function) (Exercise 4.22) BSPEVL, BSPINT, BSPLIN, DIVDIF, GAUBND, NEARST, RATNAL, SPLEVL, SPLINE
SMOOTH	To draw a smooth curve through a set of tabular points using cubic splines (Exercise 4.22) SMOOTH, SPLEVL, SPLINE

BSPLIN To draw the B-spline basis functions over a given set of knots
BSPLIN

LINRN Linear interpolation in n dimensions
LINRN, LOCATE

POLY2 Interpolation in two dimensions (polynomial or B-spline) (Exercise 4.31)
BSPEV2, BSPINT, BSPINT2, BSPLIN, DIVDIF0, GAUBND, NEARST, POLY2

BSPINTN Interpolation in n dimension using B-splines
BSPEVN, BSPEVN1, BSPEVN2, BSPINT, BSPINTN, BSPLIN, GAUBND, RAN1

Chapter 5 Differentiation

DRVT Differentiation using $h \to 0$ extrapolation (Example 5.2)
DRVT

Chapter 6 Integration

QUAD Integration in one dimension using Simpson's rule/ Romberg integration / epsilon-algorithm/ Gauss-Legendre formula/ adaptive integration (Example 6.1)
ADPINT, EPSILN, GAUSS, KRONRD, ROMBRG, SIMSON

SPLINT Integration of a tabulated function using cubic spline or B-spline (Exercise 6.4)
BSPINT, BSPLIN, BSPQD, GAUBND, SPLEVL, SPLINE, SPLINT

GAUCBY Integration using Gauss-Chebyshev formula with weight function, $w(x) = 1/\sqrt{(x-A)(B-x)}$ (Exercise 6.23, I_4)
GAUCBY

GAUCB1 Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)/(B-x)}$ (Exercise 6.18)
GAUCB1

GAUCB2 Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)(B-x)}$ (Exercise 6.23, I_5)
GAUCB2

GAUSQ Integration over $(0, A]$ with square root singularity using a combination of Gaussian formulae (Exercise 6.14)
GAUSQ, GAUSQ2, GAUSS

GAULAG Integration over $[A, \infty)$ using a combination of Gaussian formulae (Exercise 6.10)
GAULAG, GAUSS, LAGURE

HERMIT Integration over $(-\infty, \infty)$ using Gauss-Hermite formula (Exercise 6.24, I_1)
HERMIT

GAULOG Integration over $(0, A]$ with logarithmic singularity using a combination of Gaussian formulae (Exercise 6.2, I_5)
GAULG2, GAULOG, GAUSS

GAUSRC Calculate weights and abscissas of Gaussian formula using recurrence relation of orthogonal polynomials (Gauss-Laguerre Formula)
GAUSRC, TQL2

GAULEG Calculate weights and abscissas of Gauss-Legendre quadrature formulae
GAULEG, GAUSRC, TQL2

GAUJAC Calculate weights and abscissas of Gauss-Jacobi quadrature formulae
GAMMA, GAUJAC, GAUSRC, TQL2

LAGURW Calculate weights and abscissas of Gauss-Laguerre quadrature formulae
GAMMA, GAUSRC, LAGURW, TQL2

GAUHER Calculate weights and abscissas of Gauss-Hermite quadrature formulae
GAUHER, GAUSRC, TQL2

GAUSWT Calculate weights and abscissas of Gaussian formula using moments of weight function (Exercise 6.17)
GAUSWT, GAUELM, LAGITR, POLYR

FILON Integration of an oscillatory function using Filon's formula (Exercise 6.21, I_1)
FILON

ADPINT Adaptive integration over a finite interval (Exercise 6.1)
ADPINT, GAUS16

CAUCHY Calculate Cauchy principal value of an integral over a finite interval (Exercise 6.26)
ADPINT, CAUCHY, KRONRD

EULER Summation of alternating series using Euler transformation (Exercise 6.37)
EULER

RECIN2 Recursive evaluation of double integral (Example 6.16, I_3)
ADPINT, KRONRD

RECIN3 Recursive evaluation of triple integral (Exercise 6.44)
ADPINT, KRONRD

BSPQD2 Integrate a B-spline expansion in two dimensions
BSPINT, BSPINT2, BSPLIN, BSPQD, BSPQD2, GAUBND

BSPQDN Integrate a B-spline expansion in n dimensions
BSPINT, BSPINTN, BSPLIN, BSPQD, BSPQDN, GAUBND

MULTI Multiple integration over hyper-rectangle using product Gauss rules/monomial rules/ Monte Carlo method/ equidistributed sequences (Example 6.18, I_3)
EQUIDS, MCARLO, MULINT, NGAUSS, RANF, STRINT, STROUD

MULTISP Multiple integration over hypersphere using product Gauss rules/monomial rules/ Monte Carlo method/ equidistributed sequences (Example 6.18, I_5)
EQUIDS, MCARLO, MULINT, NGAUSS, RANF, SPHND, STRINT, STROUD

Chapter 7 Nonlinear Algebraic Equations

ROOT Locate real roots in a given interval by looking for sign changes, and calculate the roots using secant or Brent's methods (Example 7.2)
BRENT, SECANT

REALRT Real roots of a nonlinear equation (bisection/ secant/ Brent's method) (Example 7.2)
BISECT, BRENT, SECANT

NEWRAP Solve a nonlinear equation using Newton-Raphson method (Example 7.4)
NEWRAP

SECAN_2 Solve a nonlinear equation using secant iteration with function in scaled form ($f(x) = F(x)2^{i(x)}$) (Exercise 7.44)
CROUT, SECAN_2, SECANI

SEARCH Locate complex zeros by looking for sign changes (Example 7.6)
SEARCH

SECANC Complex roots of a nonlinear equation using secant or Muller's method (Example 7.6)
MULLER, SECANC

MULLER Complex root using Muller's method (Example 7.6)
MULLER, ZROOT

MULER2 Complex root using secant or Muller's method with function value in a scaled form, $f(x) \times 2^{i(x)}$ (Exercise 7.44)
CROUT_C, MULER2, SECANC_2, ZROOT2

DELVES Complex zeros of an analytic function using quadrature based method (Example 7.8)
CONTUR, DELVES, LAGITC, NEWRAC, POLYC

POLYR All roots of a polynomial with real coefficients
LAGITR, POLYR

POLYC All roots of a polynomial with complex coefficients
LAGITC, POLYC

RECRT2 Recursive solution of a system of two nonlinear equations (Exercise 7.49 (i))
BRENT, SECANT

NEWTON Solve a system of nonlinear equations using Newton's method (Example 7.14)
DAVIDN, GAUELM, NEWTON

BROYDN Solve a system of nonlinear equations using Broyden's method (Example 7.15)
BROYDN, DAVIDN_B, GAUELM

Chapter 8 Optimisation

GOLDEN Minimisation in one dimension using golden section search (Example 8.1)
BRACKM, GOLDEN

BRENTM Minimisation in one dimension using Brent's method (Example 8.2)
BRENTM

DAVIDM Minimisation in one dimension using cubic Hermite interpolation (Example 8.3)
DAVIDM

BFGS Minimisation in n dimensions using quasi-Newton method with BFGS formula (Example 8.4)
BFGS, FLNM, LINMIN

NMINF Minimisation in n dimensions using direction set method (Example 8.5)
FLN, LINMNF, NMINF, SVD

SIMPLX Solving a linear programming problem using simplex method
SIMPLX, SIMPX

ANNEAL Minimisation using simulated annealing (Example 8.7)
RANF, SPLEVL, SPLINE

Chapter 9 Statistical Inferences

MEDIAN To calculate median, mean and higher moments of a distribution
SHSORT

BINOM To simulate a binomial distribution
GAMMA, GAMMAL, GAMMAP, IRANBIN

POISSON To simulate a Poisson distribution
GAMMA, GAMMAL, GAMMAP, IRANPOI

BETAP To calculate the incomplete beta function and incomplete gamma function
ADPINT, BETAI, BETAP, BETCON, BETCON1, BETSER, FBETA, GAMMA, GAMMAL, GAMMAP, KRONRD

PCOR To calculate the correlation coefficient and the probability that two uncorrelated sequence will have a value as high as that obtained
ERF, GAMMAL, PCOR, RAN1

Chapter 10 Functional Approximations

POLFIT Least squares polynomial fit using orthogonal polynomials (Example 9.3)
POLEVL, POLFIT, RANGAU

POLFIT2 Least squares polynomial fit using orthogonal polynomials in two dimensions
POLEV2, POLFIT1, POLFIT2, POLORT, RANGAU

POLFITN Least squares polynomial fit using orthogonal polynomials in n dimensions
POLEVN, POLEVN1, POLEVN2, POLFIT1, POLFITN, POLORT, RANGAU

LLSQ Linear least squares fit in 3 dimensions using SVD
LLSQ, RANGAU, SVD, SVDEVL

LLSQ1 Linear least squares fit in 1 dimension using SVD (Example 9.3)
LLSQ, RANGAU, SVD, SVDEVL

BSPFIT Least squares fit to B-spline basis functions in one dimension (Example 9.3)
BSPEVL, BSPFIT, BSPLIN, RAN1, SVD, SVDEVL

BSPFIT2 Least squares fit to B-spline basis in two dimensions
BSPEV2, BSPEVL, BSPFIT, BSPFIT2, BSPFITW2, BSPLIN, RANGAU, SVD, SVDEVL

BSPFITN	Least squares fit to B-spline basis in n dimensions (Exercise 9.70) BSPEVL, BSPEVN, BSPFIT, BSPFITN, BSPFITWN, BSPLIN, RANGAU, SVD, SVDEVL
LINFITXY	Straight line fit to data when there are errors in both x and y LINFITXY, RAN1
NLLSQ	Nonlinear least squares fit using quasi Newton method/ direction set method (Example 9.4) BFGS, FLN, FLNM, LINMIN, LINMNF, NLLSQ, NLLSQ_F, NMINF, RANGAU, SVD
FFT	Fast Fourier transform/ discrete Fourier transform of complex data (Example 9.5) DFT, FFT
FFTR	Fast Fourier transform of real data (Example 9.5) FFT, FFTR
FFTN	Fast Fourier transform of complex data in n dimensions FFTN
LAPINV	Inverse Laplace transform (Example 9.7) LAPINV
POLD	Evaluate a polynomial and its derivative at any point POLD
RMK	Evaluate a rational function at any point RMK, RMKD
RMK1	Evaluate a rational function at any point (constant term in denominator 1) RMK1, RMKD1
PADE	Calculate coefficients of Padé approximations (Example 9.8) GAUELM, PADE
CHEBCF	Convert from power series to Chebyshev expansion and vice versa CHEBCF
CHEBEX	Calculate the coefficients of Chebyshev expansion CHEBEX
CHEBAP	Rational function approximation using Chebyshev polynomials (Example 9.9) CHEBAP, GAUELM
REMES	Minimax approximation to mathematical functions using Remes algorithm (Example 9.10) BRENTM, FM, GAUELM, REMES
GAMMA	Calculate Gamma function and its logarithm GAMMAL, GAMMA
ERF	Calculate Error function and complementary error function ERF, ERFC
BESSEL	Calculate Bessel functions of various types of integral order BJ0, BJ1, BJN, BJY0, BJY1, BI0, BI1, BIN, BK0, BK1, BKN, BY0, BY1, BYN, SPHBJN

DAWSON Calculate the value of Dawson's integral
DAWSON

FERMI Calculate the Fermi integrals
FERMM05, FERM05, FERM15, FERM25

PLM Calculate the associated Legendre function
PLEG, PLM

YLM Calculate the spherical harmonic
PLM, YLM, YLM_X

MINMAX Rational function minimax approximation of tabulated functions (Exercise 9.57)
MINMAX, SIMPX

POLYL1 Polynomial L_1-approximation to discrete data (Example 9.13)
LINL1, POLYL1, RANGAU, SIMPL1

Chapter 11 Algebraic Eigenvalue Problem

INVIT Real eigenvalue and eigenvector of a real matrix using inverse iteration
GAUELM, INVIT, INVIT_L

GENEVP Eigenvalues and eigenvectors of a generalised eigenvalue problem (Exercise 10.34)
CROUT_C, GAUELM_C, INVIT_CC, MULER2, ZROOT2

REALSY Eigenvalue problem for real symmetric matrix (QL algorithm/ Sturm seq.)
RAN1, STURM, TINVIT, TQL2, TRBAK, TRED2, TRIDIA

HEREVP Eigenvalue problem for a hermitian matrix
HEREVP, TQL2, TRED2

UNSYM Eigenvalues and eigenvectors of an unsymmetric matrix
BALANC, BALBAK, ELMHES, GAUELM_C, HQR, INVIT_C

UNSYML Eigenvalues and left-eigenvectors of an unsymmetric matrix
BALANC, BALBAK_L, ELMHES, GAUELM_C, HQR, INVIT_CL

Chapter 12 Ordinary Differential Equations

MSTEP Initial value problem using predictor-corrector method with adaptive step size (Adams/ Gear's method) (Exercise 11.34)
ADAMS, GAUELM, GEAR, MSTEP, RK4, STRT4

RKM Initial value problem using fourth-order Runge-Kutta method with adaptive step size (Example 11.6)
RK4, RKM

RKM_2 Initial value problem using second-order Runge-Kutta method with adaptive step size (Example 11.6)
RK2, RKM_2

EXTP Initial value problem using extrapolation method (Example 11.4)
EXTP

SHOOT Two-point boundary value problem using shooting method (Example 11.11)
BRENT, RK4, RKM

FDM — Two-point boundary value problem using finite difference method (Example 11.13)
FDM, GAUBLK, SETMAT

GEVP — Eigenvalue problem in differential equations using finite difference method (Example 11.14)
GAUBLK, GEVP, SECANI, SETMAT

GEVP_C — Eigenvalue problem in differential equations using finite difference method (complex version) (Example 11.14)
GAUBLK_C, GEVP_C, MULER2, SETMAT_C

BSPODE — Two-point boundary value problem using expansion method with B-spline basis functions (Example 11.13)
BSPEVL, BSPLIN, BSPODE, SVD, SVDEVL

Chapter 13 Integral Equations

FRED — Solve a Fredholm equation using quadrature method (Example 12.1)
FRED, GAUELM, INVIT

FREDCO — Solve a Fredholm equation using collocation method (Example 12.4)
ADPINT, FREDCO, FUNK, GAUELM, KRONRD

FRED3 — Solve an eigenvalue problem in Fredholm equation using quadrature method (Example 12.3)
FRED, GAUELM, INVIT

RLS — Solve a linear inverse problem using regularised least squares technique (Exercise 12.23)
BSPEVL, BSPLIN, FORW, RANGAU, RLS, SVD, SVDEVL

VOLT2 — Solve a nonlinear Volterra equation of the second kind using Simpson's rule (Example 12.6)
VOLT2

VOLT — Solve a linear Volterra equation using trapezoidal rule (Example 12.7)
VOLT

Chapter 14 Partial Differential Equations

CRANK — Linear second-order parabolic equation using Crank-Nicolson method (Example 13.1)
CRANK

LINES — Nonlinear parabolic equations using the method of lines (Example 13.2)
ADAMS, BRENT, GAUELM, GEAR, LINES, MSTEP, RK4, STRT4

ADM — Parabolic equation in two space variables using alternating direction method (Exercise 13.14)
ADM

LAX — Nonlinear hyperbolic equations using the Lax-Wendroff method (Example 13.3)
LAX

ALPHABETIC LIST OF FORTRAN EXAMPLES

ADI	Linear second-order elliptic equations using the alternating direction implicit iterative (ADI) method (Example 13.5) ADI
ADM	Parabolic equation in two space variables using alternating direction method (Exercise 13.14) ADM
ADPINT	Adaptive integration over a finite interval (Exercise 6.1) ADPINT, GAUS16
ANNEAL	Minimisation using simulated annealing (Example 8.7) RANF, SPLEVL, SPLINE
BESSEL	Calculate Bessel functions of various types of integral order BJ0, BJ1, BJN, BJY0, BJY1, BI0, BI1, BIN, BK0, BK1, BKN, BY0, BY1, BYN, SPHBJN
BETAP	To calculate the incomplete beta function and incomplete gamma function ADPINT, BETAI, BETAP, BETCON, BETCON1, BETSER, FBETA, GAMMA, GAMMAL, GAMMAP, KRONRD
BFGS	Minimisation in n dimensions using quasi-Newton method with BFGS formula (Example 8.4) BFGS, FLNM, LINMIN
BINOM	To simulate a binomial distribution GAMMA, GAMMAL, GAMMAP, IRANBIN
BRENTM	Minimisation in one dimension using Brent's method (Example 8.2) BRENTM
BROYDN	Solve a system of nonlinear equations using Broyden's method (Example 7.15) BROYDN, DAVIDN_B, GAUELM
BSPFIT	Least squares fit to B-spline basis functions in one dimension (Example 9.3) BSPEVL, BSPFIT, BSPLIN, RAN1, SVD, SVDEVL
BSPFIT2	Least squares fit to B-spline basis in two dimensions BSPEV2, BSPEVL, BSPFIT, BSPFIT2, BSPFITW2, BSPLIN, RANGAU, SVD, SVDEVL

BSPFITN	Least squares fit to B-spline basis in n dimensions (Exercise 9.71) BSPEVL, BSPEVN, BSPFIT, BSPFITN, BSPFITWN, BSPLIN, RANGAU, SVD, SVDEVL
BSPINTN	Interpolation in n dimension using B-splines BSPEVN, BSPEVN1, BSPEVN2, BSPINT, BSPINTN, BSPLIN, GAUBND, RAN1
BSPLIN	To draw the B-spline basis functions over a given set of knots BSPLIN
BSPODE	Two-point boundary value problem using expansion method with B-spline basis functions (Example 11.13) BSPEVL, BSPLIN, BSPODE, SVD, SVDEVL
BSPQD2	Integrate a B-spline expansion in two dimensions BSPINT, BSPINT2, BSPLIN, BSPQD, BSPQD2, GAUBND
BSPQDN	Integrate a B-spline expansion in n dimensions BSPINT, BSPINTN, BSPLIN, BSPQD, BSPQDN, GAUBND
CAUCHY	Calculate Cauchy principal value of an integral over a finite interval (Exercise 6.26) ADPINT, CAUCHY, KRONRD
CHEBAP	Rational function approximation using Chebyshev polynomials (Example 9.9) CHEBAP, GAUELM
CHEBCF	Convert from power series to Chebyshev expansion and vice versa CHEBCF
CHEBEX	Calculate the coefficients of Chebyshev expansion CHEBEX
CMAT	Inverse of a complex band matrix using Gaussian elimination GAUBND_C, RAN1
CRANK	Linear second-order parabolic equation using Crank-Nicolson method (Example 13.1) CRANK
DAVIDM	Minimisation in one dimension using cubic Hermite interpolation (Example 8.3) DAVIDM
DAWSON	Calculate the value of Dawson's integral DAWSON
DELVES	Complex zeros of an analytic function using quadrature based method (Example 7.8) CONTUR, DELVES, LAGITC, NEWRAC, POLYC
DRVT	Differentiation using $h \to 0$ extrapolation (Example 5.2) DRVT

ERF — Calculate Error function and complementary error function
ERF, ERFC

EULER — Summation of alternating series using Euler transformation (Exercise 6.37)
EULER

EXTP — Initial value problem using extrapolation method (Example 11.4)
EXTP

FDM — Two-point boundary value problem using finite difference method (Example 11.13)
FDM, GAUBLK, SETMAT

FERMI — Calculate the Fermi integrals
FERMM05, FERM05, FERM15, FERM25

FFT — Fast Fourier transform/ discrete Fourier transform of complex data (Example 9.5)
DFT, FFT

FFTN — Fast Fourier transform of complex data in n dimensions
FFTN

FFTR — Fast Fourier transform of real data (Example 9.5)
FFT, FFTR

FILON — Integration of an oscillatory function using Filon's formula (Exercise 6.21, I_1)
FILON

FRED — Solve a Fredholm equation using quadrature method (Example 12.1)
FRED, GAUELM, INVIT

FRED3 — Solve an eigenvalue problem in Fredholm equation using quadrature method (Example 12.3)
FRED, GAUELM, INVIT

FREDCO — Solve a Fredholm equation using collocation method (Example 12.4)
ADPINT, FREDCO, FUNK, GAUELM, KRONRD

GAMMA — Calculate Gamma function and its logarithm
GAMMAL, GAMMA

GAUBND — Solve a system of linear equation for a band matrix using Gaussian elimination
GAUBND, RAN1

GAUCB1 — Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)/(B-x)}$ (Exercise 6.18)
GAUCB1

GAUCB2 — Integration using Gauss-Chebyshev formula with weight function, $w(x) = \sqrt{(x-A)(B-x)}$ (Exercise 6.23, I_5)
GAUCB2

GAUCBY Integration using Gauss-Chebyshev formula with weight function, $w(x) = 1/\sqrt{(x-A)(B-x)}$ (Exercise 6.23, I_4)
GAUCBY

GAUHER Calculate weights and abscissas of Gauss-Hermite quadrature formulae
GAUHER, GAUSRC, TQL2

GAUJAC Calculate weights and abscissas of Gauss-Jacobi quadrature formulae
GAMMA, GAUJAC, GAUSRC, TQL2

GAULAG Integration over $[A, \infty)$ using a combination of Gaussian formulae (Exercise 6.10)
GAULAG, GAUSS, LAGURE

GAULEG Calculate weights and abscissas of Gauss-Legendre quadrature formulae
GAULEG, GAUSRC, TQL2

GAULOG Integration over $(0, A]$ with logarithmic singularity using a combination of Gaussian formulae (Exercise 6.2, I_5)
GAULG2, GAULOG, GAUSS

GAUSQ Integration over $(0, A]$ with square root singularity using a combination of Gaussian formulae (Exercise 6.14)
GAUSQ, GAUSQ2, GAUSS

GAUSRC Calculate weights and abscissas of Gaussian formula using recurrence relation of orthogonal polynomials (Gauss-Laguerre Formula)
GAUSRC, TQL2

GAUSWT Calculate weights and abscissas of Gaussian formula using moments of weight function (Exercise 6.17)
GAUSWT, GAUELM, LAGITR, POLYR

GENEVP Eigenvalues and eigenvectors of a generalised eigenvalue problem (Exercise 10.34)
CROUT_C, GAUELM_C, INVIT_CC, MULER2, ZROOT2

GEVP Eigenvalue problem in differential equations using finite difference method (Example 11.14)
GAUBLK, GEVP, SECANI, SETMAT

GEVP_C Eigenvalue problem in differential equations using finite difference method (complex version) (Example 11.14)
GAUBLK_C, GEVP_C, MULER2, SETMAT_C

GOLDEN Minimisation in one dimension using golden section search (Example 8.1)
BRACKM, GOLDEN

HEREVP Eigenvalue problem for a hermitian matrix
HEREVP, TQL2, TRED2

HERMIT Integration over $(-\infty, \infty)$ using Gauss-Hermite formula (Exercise 6.24, I_1)
HERMIT

INTERP Interpolation in one dimension (polynomial/ spline/ B-spline/ rational function) (Exercise 4.22)
BSPEVL, BSPINT, BSPLIN, DIVDIF, GAUBND, NEARST, RATNAL, SPLEVL, SPLINE

INVIT Real eigenvalue and eigenvector of a real matrix using inverse iteration
GAUELM, INVIT, INVIT_L

LAGURW Calculate weights and abscissas of Gauss-Laguerre quadrature formulae
GAMMA, GAUSRC, LAGURW, TQL2

LAPINV Inverse Laplace transform (Example 9.7)
LAPINV

LAX Nonlinear hyperbolic equations using the Lax-Wendroff method (Example 13.3)
LAX

LINEAR Solve a system of linear equations using Gaussian elimination/ Crout's algorithm/ iterative refinement/ Cholesky decomposition/ singular value decomposition (Example 3.5)
CHOLSK, CROUT, CROUTH, GAUELM, SVD, SVDEVL

LINES Nonlinear parabolic equations using the method of lines (Example 13.2)
ADAMS, BRENT, GAUELM, GEAR, LINES, MSTEP, RK4, STRT4

LINFITXY Straight line fit to data when there are errors in both x and y
LINFITXY, RAN1

LINRN Linear interpolation in n dimensions
LINRN, LOCATE

LLSQ Linear least squares fit in 3 dimensions using SVD
LLSQ, RANGAU, SVD, SVDEVL

LLSQ1 Linear least squares fit in 1 dimension using SVD (Example 9.3)
LLSQ, RANGAU, SVD, SVDEVL

MATINV Inverse of a real matrix using Gaussian elimination
GAUELM, MATINV

MEDIAN To calculate median, mean and higher moments of a distribution
SHSORT

MINMAX Rational function minimax approximation of tabulated functions (Exercise 9.66)
MINMAX, SIMPX

MSTEP Initial value problem using predictor-corrector method with adaptive step size (Adams/ Gear's method) (Exercise 11.34)
ADAMS, GAUELM, GEAR, MSTEP, RK4, STRT4

MULER2 Complex root using secant or Muller's method with function value in a scaled form, $f(x) \times 2^{i(x)}$ (Exercise 7.44)
CROUT_C, MULER2, SECANC_2, ZROOT2

MULLER	Complex root using Muller's method (Example 7.6) MULLER, ZROOT
MULTI	Multiple integration over hyper-rectangle using product Gauss rules/monomial rules/ Monte Carlo method/ equidistributed sequences (Example 6.18, I_3) EQUIDS, MCARLO, MULINT, NGAUSS, RANF, STRINT, STROUD
MULTISP	Multiple integration over hypersphere using product Gauss rules/monomial rules/ Monte Carlo method/ equidistributed sequences (Example 6.18, I_5) EQUIDS, MCARLO, MULINT, NGAUSS, RANF, SPHND, STRINT, STROUD
NEWRAP	Solve a nonlinear equation using Newton-Raphson method (Example 7.4) NEWRAP
NEWTON	Solve a system of nonlinear equations using Newton's method (Example 7.14) DAVIDN, GAUELM, NEWTON
NLLSQ	Nonlinear least squares fit using quasi Newton method/ direction set method (Example 9.4) BFGS, FLN, FLNM, LINMIN, LINMNF, NLLSQ, NLLSQ_F, NMINF, RANGAU, SVD
NMINF	Minimisation in n dimensions using direction set method (Example 8.5) FLN, LINMNF, NMINF, SVD
PADE	Calculate coefficients of Padé approximations (Example 9.8) GAUELM, PADE
PCOR	To calculate the correlation coefficient and the probability that two uncorrelated sequence will have a value as high as that obtained ERF, GAMMAL, PCOR, RAN1
PLM	Calculate the associated Legendre function PLEG, PLM GAMMA, GAMMAL, GAMMAP, IRANBIN
POISSON	To simulate a Poisson distribution
POLD	Evaluate a polynomial and its derivative at any point POLD
POLFIT	Least squares polynomial fit using orthogonal polynomials (Example 9.3) POLEVL, POLFIT, RANGAU
POLFIT2	Least squares polynomial fit using orthogonal polynomials in two dimensions POLEV2, POLFIT1, POLFIT2, POLORT, RANGAU
POLFITN	Least squares polynomial fit using orthogonal polynomials in n dimensions POLEVN, POLEVN1, POLEVN2, POLFIT1, POLFITN, POLORT, RANGAU
POLY2	Interpolation in two dimensions (polynomial or B-spline) (Exercise 4.31) BSPEV2, BSPINT, BSPINT2, BSPLIN, DIVDIF0, GAUBND, NEARST, POLY2
POLYC	All roots of a polynomial with complex coefficients LAGITC, POLYC

POLYL1	Polynomial L_1-approximation to discrete data (Example 9.13) LINL1, POLYL1, RANGAU, SIMPL1
POLYR	All roots of a polynomial with real coefficients LAGITR, POLYR
QUAD	Integration in one dimension using Simpson's rule/ Romberg integration / epsilon-algorithm/ Gauss-Legendre formula/ adaptive integration (Example 6.1) ADPINT, EPSILN, GAUSS, KRONRD, ROMBRG, SIMSON
REALRT	Real roots of a nonlinear equation (bisection/ secant/ Brent's method) (Example 7.2) BISECT, BRENT, SECANT
REALSY	Eigenvalue problem for real symmetric matrix (QL algorithm/ Sturm seq.) RAN1, STURM, TINVIT, TQL2, TRBAK, TRED2, TRIDIA
RECIN2	Recursive evaluation of double integral (Example 6.16, I_3) ADPINT, KRONRD
RECIN3	Recursive evaluation of triple integral (Exercise 6.44) ADPINT, KRONRD
RECRT2	Recursive solution of a system of two nonlinear equations (Exercise 7.49 (i)) BRENT, SECANT
REMES	Minimax approximation to mathematical functions using Remes algorithm (Example 9.10) BRENTM, FM, GAUELM, REMES
RKM	Initial value problem using fourth-order Runge-Kutta method with adaptive step size (Example 11.6) RK4, RKM
RKM_2	Initial value problem using second-order Runge-Kutta method with adaptive step size (Example 11.6) RK2, RKM_2
RLS	Solve a linear inverse problem using regularised least squares technique (Exercise 12.23) BSPEVL, BSPLIN, FORW, RANGAU, RLS, SVD, SVDEVL
RMK	Evaluate a rational function at any point RMK, RMKD
RMK1	Evaluate a rational function at any point (constant term in denominator 1) RMK1, RMKD1
ROOT	Locate real roots in a given interval by looking for sign changes, and calculate the roots using secant or Brent's methods (Example 7.2) BRENT, SECANT
ROUND	Rounding a floating-point number to a specified number of digits ROUND

SEARCH	Locate complex zeros by looking for sign changes (Example 7.6) SEARCH
SECAN_2	Solve a nonlinear equation using secant iteration with function in scaled form ($f(x) = F(x)2^{i(x)}$) (Exercise 7.44) CROUT, SECAN_2, SECANI
SECANC	Complex roots of a nonlinear equation using secant or Muller's method (Example 7.6) MULLER, SECANC
SHOOT	Two-point boundary value problem using shooting method (Example 11.11) BRENT, RK4, RKM
SIMPLX	Solving a linear programming problem using simplex method SIMPLX, SIMPX
SMOOTH	To draw a smooth curve through a set of tabular points using cubic splines (Exercise 4.22) SMOOTH, SPLEVL, SPLINE
SOR	Linear second-order elliptic equations using the successive over-relaxation (SOR) method (Example 13.4) SOR
SPLINT	Integration of a tabulated function using cubic spline or B-spline (Exercise 6.4) BSPINT, BSPLIN, BSPQD, GAUBND, SPLEVL, SPLINE, SPLINT
SUM	Cascade sum of a finite series using a function to calculate the terms (Example 2.2) CASSUM
SUM_A	Cascade sum of a finite series using an array to supply the terms (Example 2.2) CASSUM_A
UNSYM	Eigenvalues and eigenvectors of an unsymmetric matrix BALANC, BALBAK, ELMHES, GAUELM_C, HQR, INVIT_C
UNSYML	Eigenvalues and left-eigenvectors of an unsymmetric matrix BALANC, BALBAK_L, ELMHES, GAUELM_C, HQR, INVIT_CL
VOLT	Solve a linear Volterra equation using trapezoidal rule (Example 12.7) VOLT
VOLT2	Solve a nonlinear Volterra equation of the second kind using Simpson's rule (Example 12.6) VOLT2
YLM	Calculate the spherical harmonic PLM, YLM, YLM_X