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Module 3.2: nag_gamma_fun
Gamma Functions

nag_gamma	Gamma function
nag_log_gamma	Log gamma function
nag_polygamma	Polygamma functions
nag_incompl_gamma	Incomplete gamma functions

Module 3.3: nag_err_fun
Error Functions

nag_erf	Error function erf x
nag_erfc	Complementary error function erfc x
nag_dawson	Dawson's integral $F(x)$

Module 3.4: nag_bessel_fun
Bessel Functions

nag_bessel_j0	Bessel function $J_0(x)$
nag_bessel_j1	Bessel function $J_1(x)$
nag_bessel_j	Bessel function $J_\nu(z)$
nag_bessel_y0	Bessel function $Y_0(x)$
nag_bessel_y1	Bessel function $Y_1(x)$
nag_bessel_y	Bessel function $Y_\nu(z)$
nag_bessel_i0	Modified Bessel function $I_0(x)$
nag_bessel_i1	Modified Bessel function $I_1(x)$
nag_bessel_i	Modified Bessel function $I_\nu(z)$
nag_bessel_k0	Modified Bessel function $K_0(x)$
nag_bessel_k1	Modified Bessel function $K_1(x)$
nag_bessel_k	Modified Bessel function $K_\nu(z)$

Module 3.5: nag_fresnel_intg
Fresnel Integrals

nag_fresnel_s	Fresnel integral $S(x)$
nag_fresnel_c	Fresnel integral $C(x)$

Module 3.6: nag_ell_intg
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nag_ell_rf	Symmetrised elliptic integral of the first kind
nag_ell_rc	Degenerate form of elliptic integral of the first kind
nag_ell_rd	Symmetrised elliptic integral of the second kind
nag_ell_rj	Symmetrised elliptic integral of the third kind

Module 3.7: nag_ell_fun
Elliptic Functions

nag_ell_jac	Jacobian elliptic functions sn, cn and dn

Module 3.8: nag_airy_fun
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nag_airy_ai	Airy function Ai(z)
nag_airy_bi	Airy function Bi(z)

Module 3.9: nag_kelvin_fun
Kelvin Functions

nag_kelvin_ber	Kelvin function ber x
nag_kelvin_bei	Kelvin function bei x
nag_kelvin_ker	Kelvin function ker x
nag_kelvin_kei	Kelvin function kei x

Chapter 4: Matrix and Vector Operations

Module 4.1: nag_mat_norm
Norms of a Matrix

nag_gen_mat_norm	Computes a norm, or the element of largest absolute value, of a general real or complex matrix
nag_gen_bnd_mat_norm	Computes a norm, or the element of largest absolute value, of a real or complex square banded matrix
nag_sym_mat_norm	Computes a norm, or the element of largest absolute value, of a real or complex, symmetric or Hermitian matrix, stored in conventional or packed storage
nag_sym_bnd_mat_norm	Computes a norm, or the element of largest absolute value, of a real or complex, symmetric or Hermitian band matrix
nag_trap_mat_norm	Computes a norm, or the element of largest absolute value, of a real or complex trapezoidal matrix
nag_tri_mat_norm	Computes a norm, or the element of largest absolute value, of a real or complex triangular matrix, stored in conventional or packed storage
nag_tri_bnd_mat_norm	Computes a norm, or the element of largest absolute value, of a real or complex triangular band matrix
nag_hessen_mat_norm	Computes a norm, or the element of largest absolute value, of a real or complex upper Hessenberg matrix

Chapter 5: Linear Equations

Module 5.1: nag_gen_lin_sys
General Systems of Linear Equations

nag_gen_lin_sol	Solves a general real or complex system of linear equations with one or many right-hand sides
nag_gen_lin_fac	Performs an LU factorization of a general real or complex matrix
nag_gen_lin_sol_fac	Solves a general real or complex system of linear equations, with coefficient matrix previously factorized by nag_gen_lin_fac

Module 5.2: nag_sym_lin_sys
Symmetric Systems of Linear Equations

nag_sym_lin_sol	Solves a real or complex, symmetric or Hermitian system of linear equations with one or many right-hand sides
nag_sym_lin_fac	Performs a Cholesky or Bunch–Kaufman factorization of a real or complex, symmetric or Hermitian matrix
nag_sym_lin_sol_fac	Solves a real or complex, symmetric or Hermitian system of linear equations, with coefficient matrix previously factorized by nag_sym_lin_fac

Module 5.3: nag_tri_lin_sys
Triangular Systems of Linear Equations

nag_tri_lin_sol	Solves a real or complex triangular system of linear equations
nag_tri_lin_cond	Estimates the condition number of a real or complex triangular matrix
nag_tri_mat_det	Evaluates the determinant of a real or complex triangular matrix

Module 5.4: nag_gen_bnd_lin_sys
General Banded Systems of Linear Equations

nag_gen_bnd_lin_sol	Solves a general real or complex banded system of linear equations, with one or many right-hand sides
nag_gen_bnd_lin_fac	Performs an *LU* factorization of a general real or complex band matrix
nag_gen_bnd_lin_sol_fac	Solves a general real or complex banded system of linear equations, with coefficient matrix previously factorized by nag_gen_bnd_lin_fac

Module 5.5: nag_sym_bnd_lin_sys
Symmetric Banded Systems of Linear Equations

nag_sym_bnd_lin_sol	Solves a real symmetric or complex Hermitian positive definite banded system of linear equations, with one or many right-hand sides
nag_sym_bnd_lin_fac	Performs a Cholesky factorization of a real symmetric or complex Hermitian positive definite band matrix
nag_sym_bnd_lin_sol_fac	Solves a real symmetric or complex Hermitian positive definite banded system of linear equations, with coefficient matrix previously factorized by nag_sym_bnd_lin_fac

Chapter 6: Eigenvalue and Least-squares Problems

Module 6.1: nag_sym_eig
Standard Symmetric Eigenvalue Problems

nag_sym_eig_all	All eigenvalues, and optionally eigenvectors, of a real symmetric or complex Hermitian matrix
nag_sym_eig_sel	Selected eigenvalues, and optionally the corresponding eigenvectors, of a real symmetric or complex Hermitian matrix
nag_sym_tridiag_reduc	Reduction of a real symmetric or complex Hermitian matrix to real symmetric tridiagonal form
nag_sym_tridiag_orth	Form or apply the transformation matrix determined by nag_sym_tridiag_reduc
nag_sym_tridiag_eig_all	All eigenvalues, and optionally eigenvectors, of a real symmetric tridiagonal matrix
nag_sym_tridiag_eig_val	Selected eigenvalues of a real symmetric tridiagonal matrix
nag_sym_tridiag_eig_vec	Selected eigenvectors of a real symmetric tridiagonal matrix

Module 6.2: nag_nsym_eig
Standard Nonsymmetric Eigenvalue Problems

nag_nsym_eig_all	All eigenvalues, and optionally eigenvectors, of a general real or complex matrix
nag_schur_fac	Schur factorization of a general real or complex matrix

Module 6.3: nag_svd
Singular Value Decomposition (SVD)

nag_gen_svd	Singular value decomposition of a general real or complex matrix
nag_gen_bidiag_reduc	Reduction of a general real or complex matrix to real bidiagonal form
nag_bidiag_svd	Singular value decomposition of a real bidiagonal matrix

Module 6.4: nag_lin_lsq
Linear Least-squares Problems

nag_lin_lsq_sol	Solves a real or complex linear least-squares problem
nag_lin_lsq_sol_svd	Solves a real or complex linear least-squares problem, assuming that a singular value decomposition of the coefficient matrix has already been computed
nag_qr_fac	QR factorization of a general real or complex matrix
nag_qr_orth	Form or apply the matrix Q determined by nag_qr_fac
nag_lin_lsq_sol_qr	Solves a real or complex linear least-squares problem, assuming that the QR factorization of the coefficient matrix has already been computed
nag_lin_lsq_sol_qr_svd	Solves a real or complex linear least-squares problem using the SVD, assuming that the QR factorization of the coefficient matrix has already been computed

Module 6.5: nag_sym_gen_eig
Symmetric-definite Generalized Eigenvalue Problems

nag_sym_gen_eig_all	All eigenvalues, and optionally eigenvectors, of a real symmetric-definite or complex Hermitian-definite generalized eigenvalue problem
nag_sym_gen_eig_sel	Selected eigenvalues, and optionally the corresponding eigenvectors, of a real symmetric-definite or complex Hermitian-definite generalized eigenvalue problem

Module 6.6: nag_nsym_gen_eig
Nonsymmetric Generalized Eigenvalue Problems

nag_nsym_gen_eig_all	All eigenvalues, and optionally eigenvectors, of a real or complex nonsymmetric generalized eigenvalue problem
nag_gen_schur_fac	Generalized Schur factorization of a real or complex matrix pencil

Chapter 7: Transforms

Module 7.1: nag_fft
Discrete Fourier Transforms

nag_fft_1d	Single or multiple 1-d complex discrete Fourier transform, or its inverse
nag_fft_1d_real	Single or multiple 1-d real or Hermitian discrete Fourier transform, or its inverse
nag_fft_1d_basic	Single or multiple 1-d real, Hermitian or complex discrete Fourier transform. The transform is overwritten on the input data

Module 7.2: nag_sym_fft
Symmetric Discrete Fourier Transforms

Module 7.3: nag_conv
Convolution and Correlation

Chapter 8: Curve and Surface Fitting

Module 8.1: nag_pch_interp
Piecewise Cubic Hermite Interpolation

Module 8.2: nag_spline_1d
One-dimensional Spline Fitting

Module 8.3: nag_spline_2d
Two-dimensional Spline Fitting

Module 8.4: nag_scat_interp
Interpolation of Scattered Data

Chapter 9: Optimization

Module 9.1: nag_qp
Linear and Quadratic Programming

Module 9.2: nag_nlin_lsq
Unconstrained Nonlinear Least-squares

Module 20.2: nag_t_dist
Probabilities and Deviate for a Student's t-distribution

nag_t_prob	Computes probabilities for various parts of a Student's t-distribution with ν degrees of freedom
nag_t_deviate	Computes the deviate associated with a given probability of a Student's t-distribution

Module 20.3: nag_chisq_dist
Probabilities and Deviate for a χ^2-distribution

nag_chisq_prob	Computes lower or upper tail probability for a χ^2-distribution with ν degrees of freedom
nag_chisq_deviate	Computes the deviate associated with a given lower tail probability of a χ^2-distribution with ν degrees of freedom

Module 20.4: nag_f_dist
Probabilities and Deviate for an F-distribution

nag_f_prob	Computes lower or upper tail probability for an F-distribution with ν_1 and ν_2 degrees of freedom
nag_f_deviate	Computes the deviate associated with a given lower tail probability of an F-distribution with ν_1 and ν_2 degrees of freedom

Module 20.5: nag_beta_dist
Probabilities and Deviate for a Beta Distribution

nag_beta_prob	Computes lower or upper tail probability for a beta distribution with parameters a and b
nag_beta_deviate	Computes the deviate associated with a given lower tail probability of a beta distribution with parameters a and b

Module 20.6: nag_gamma_dist
Probabilities and Deviate for a Gamma Distribution

nag_gamma_prob	Computes lower or upper tail probability for a gamma distribution with shape parameter a and scale parameter b
nag_gamma_deviate	Computes the deviate associated with a given lower tail probability of a gamma distribution with shape parameter a and scale parameter b

Module 20.7: nag_discrete_dist
Probabilities for Discrete Distributions

nag_binom_prob	Computes lower tail, upper tail or point probability for a binomial distribution with parameters n and p
nag_poisson_prob	Computes lower tail, upper tail or point probability for a Poisson distribution with parameter λ
nag_hypergeo_prob	Computes lower tail, upper tail or point probability for a hypergeometric distribution with parameters n, l, and m

Chapter 21: Random Number Generation

Module 21.1: nag_rand_util
Utilities for Random Number Generation

nag_rand_seed_set	Sets the seed used by random number generating procedures to give a repeatable or non-repeatable sequence of random numbers
nag_seed_*wp*	Stores data required to generate successive random numbers from a given stream (type)

Module 21.2: nag_rand_contin
Random Numbers from Continuous Distributions

nag_rand_uniform	Generates random numbers from a uniform distribution over (a, b)
nag_rand_normal	Generates random numbers from a Normal distribution with mean a and standard deviation b
nag_rand_mv_normal	Generates a vector of n random numbers from a multivariate Normal distribution with mean vector a and covariance matrix C
nag_rand_beta	Generates random numbers from a beta distribution with parameters a and b
nag_rand_neg_exp	Generates random numbers from a (negative) exponential distribution with mean a
nag_rand_gamma	Generates random numbers from a gamma distribution with parameters a and b

Module 21.3: nag_rand_discrete
Random Numbers from Discrete Distributions

nag_rand_binom	Generates random integers from a binomial distribution and/or returns a reference vector for the distribution
nag_rand_neg_binom	Generates random integers from a negative binomial distribution and/or returns a reference vector for the distribution
nag_rand_hypergeo	Generates random integers from an hypergeometric distribution and/or returns a reference vector for the distribution
nag_rand_user_dist	Generates random integers and/or returns a reference vector from a discrete distribution defined in terms of its PDF or CDF
nag_rand_ref_vec	Generates random integers from a discrete distribution, using a reference vector
nag_ref_vec_*wp*	Stores a reference vector which is used to generate random integers from a discrete distribution (type)

Chapter 22: Basic Descriptive Statistics

Module 22.1: nag_basic_stats
Basic Descriptive Statistics for Univariate Data

nag_summary_stats_1v	Computes basic descriptive statistics for univariate data

Chapter 25: Correlation and Regression Analysis

Module 25.1: nag_lin_reg
Regression Analysis

nag_simple_lin_reg	Performs a simple linear regression analysis for a pair of related variables
nag_mult_lin_reg	Performs a general multiple linear regression analysis for any given predictor variables and a response variable

Module 25.2: nag_correl
Correlation Analysis

nag_prod_mom_correl	Calculates the variance-covariance matrix and the Pearson product-moment correlation coefficients for a set of data
nag_part_correl	Calculates the partial variance-covariance matrix and the partial correlation matrix from a correlation or variance covariance matrix

Chapter 28: Multivariate Analysis

Module 28.1: nag_fac_analysis
Factor Analysis and Principal Component

nag_prin_comp	Performs principal component analysis

Module 28.2: nag_canon_analysis
Canonical Analysis

nag_canon_var	Performs canonical variate analysis

Module 28.3: nag_mv_rotation
Rotations

nag_orthomax	Computes orthogonal rotation, using a generalized orthomax rotations

Chapter 29: Time Series Analysis

Module 29.1: nag_tsa_identify
Time Series Analysis – Identification

nag_tsa_acf	Calculates the sample autocorrelation function of a univariate time series
nag_tsa_pacf	Calculates the sample partial autocorrelation function of a univariate time series

Module 29.2: nag_tsa_kalman
Kalman Filtering

nag_kalman_init	Provides an initial estimate of the Kalman filter state covariance matrix
nag_kalman_predict	Calculates a one step prediction for the square root covariance Kalman filter
nag_kalman_sqrt_cov_var	Calculates a time-varying square root covariance Kalman filter
nag_kalman_sqrt_cov_invar	Calculates a time-invariant square root covariance Kalman filter