

## NAG Library Chapter Contents

### G05 – Random Number Generators

#### G05 Chapter Introduction

Routine Name	Mark of Introduction	Purpose
G05KFF	22	nagf_rand_init_repeat Initializes a pseudorandom number generator to give a repeatable sequence
G05KGF	22	nagf_rand_init_nonrepeat Initializes a pseudorandom number generator to give a non-repeatable sequence
G05KHF	22	nagf_rand_init_leapfrog Primes a pseudorandom number generator for generating multiple streams using leap-frog
G05KJF	22	nagf_rand_init_skipahead Primes a pseudorandom number generator for generating multiple streams using skip-ahead
G05KKF	23	nagf_rand_init_skipahead_power2 Primes a pseudorandom number generator for generating multiple streams using skip-ahead, skipping ahead a power of 2
G05NCF	22	nagf_rand_permute Pseudorandom permutation of an integer vector
G05NDF	22	nagf_rand_sample Pseudorandom sample from an integer vector
G05NEF	23	nagf_rand_sample_wgt Pseudorandom sample, without replacement, unequal weights
G05PDF	22	nagf_rand_times_garch_asym1 Generates a realization of a time series from a GARCH process with asymmetry of the form $(\epsilon_{t-1} + \gamma)^2$
G05PEF	22	nagf_rand_times_garch_asym2 Generates a realization of a time series from a GARCH process with asymmetry of the form $( \epsilon_{t-1}  + \gamma\epsilon_{t-1})^2$
G05PFF	22	nagf_rand_times_garch_GJR Generates a realization of a time series from an asymmetric GJosten, Jagannathan and Runkle (GJR) GARCH process
G05PGF	22	nagf_rand_times_garch_exp Generates a realization of a time series from an exponential GARCH (EGARCH) process
G05PHF	22	nagf_rand_times_arma Generates a realization of a time series from an ARMA model
G05PJF	22	nagf_rand_times_mv_varma Generates a realization of a multivariate time series from a VARMA model
G05PMF	22	nagf_rand_times_smooth_exp Generates a realization of a time series from an exponential smoothing model
G05PVF	25	nagf_rand_kfold_xyw Permutes a matrix, vector, vector triplet into a form suitable for $K$ -fold cross validation
G05PWF	25	nagf_rand_subsamp_xyw Permutes a matrix, vector, vector triplet into a form suitable for random sub-sampling validation
G05PXF	22	nagf_rand_matrix_orthog Generates a random orthogonal matrix

G05PYF	22	nagf_rand_matrix_corr Generates a random correlation matrix
G05PZF	22	nagf_rand_matrix_2waytable Generates a random two-way table
G05RCF	22	nagf_rand_copula_students_t Generates a matrix of pseudorandom numbers from a Student's $t$ -copula
G05RDF	22	nagf_rand_copula_normal Generates a matrix of pseudorandom numbers from a Gaussian copula
G05REF	23	nagf_rand_copula_clayton_bivar Generates a matrix of pseudorandom numbers from a bivariate Clayton/ Cook–Johnson copula
G05RFF	23	nagf_rand_copula_frank_bivar Generates a matrix of pseudorandom numbers from a bivariate Frank copula
G05RGF	23	nagf_rand_copula_plackett_bivar Generates a matrix of pseudorandom numbers from a bivariate Plackett copula
G05RHF	23	nagf_rand_copula_clayton Generates a matrix of pseudorandom numbers from a multivariate Clayton/ Cook–Johnson copula
G05RJF	23	nagf_rand_copula_frank Generates a matrix of pseudorandom numbers from a multivariate Frank copula
G05RKF	23	nagf_rand_copula_gumbel Generates a matrix of pseudorandom numbers from a Gumbel–Hougaard copula
G05RYF	22	nagf_rand_multivar_students_t Generates a matrix of pseudorandom numbers from a multivariate Student's $t$ -distribution
G05RZF	22	nagf_rand_multivar_normal Generates a matrix of pseudorandom numbers from a multivariate Normal distribution
G05SAF	22	nagf_rand_dist_uniform01 Generates a vector of pseudorandom numbers from a uniform distribution over $(0, 1]$
G05SBF	22	nagf_rand_dist_beta Generates a vector of pseudorandom numbers from a beta distribution
G05SCF	22	nagf_rand_dist_cauchy Generates a vector of pseudorandom numbers from a Cauchy distribution
G05SDF	22	nagf_rand_dist_chisq Generates a vector of pseudorandom numbers from a $\chi^2$ distribution
G05SEF	22	nagf_rand_dist_dirichlet Generates a vector of pseudorandom numbers from a Dirichlet distribution
G05SFF	22	nagf_rand_dist_exp Generates a vector of pseudorandom numbers from an exponential distribution
G05SGF	22	nagf_rand_dist_expmix Generates a vector of pseudorandom numbers from an exponential mix distribution
G05SHF	22	nagf_rand_dist_f Generates a vector of pseudorandom numbers from an $F$ -distribution
G05SJF	22	nagf_rand_dist_gamma Generates a vector of pseudorandom numbers from a gamma distribution
G05SKF	22	nagf_rand_dist_normal Generates a vector of pseudorandom numbers from a Normal distribution
G05SLF	22	nagf_rand_dist_logistic Generates a vector of pseudorandom numbers from a logistic distribution
G05SMF	22	nagf_rand_dist_lognormal Generates a vector of pseudorandom numbers from a log-normal distribution

G05SNF	22	nagf_rand_dist_students_t Generates a vector of pseudorandom numbers from a Student's $t$ -distribution
G05SPF	22	nagf_rand_dist_triangular Generates a vector of pseudorandom numbers from a triangular distribution
G05SQF	22	nagf_rand_dist_uniform Generates a vector of pseudorandom numbers from a uniform distribution over $[a, b]$
G05SRF	22	nagf_rand_dist_vonmises Generates a vector of pseudorandom numbers from a von Mises distribution
G05SSF	22	nagf_rand_dist_weibull Generates a vector of pseudorandom numbers from a Weibull distribution
G05TAF	22	nagf_rand_int_binomial Generates a vector of pseudorandom integers from a binomial distribution
G05TBF	22	nagf_rand_logical Generates a vector of pseudorandom logical values
G05TCF	22	nagf_rand_int_geom Generates a vector of pseudorandom integers from a geometric distribution
G05TDF	22	nagf_rand_int_general Generates a vector of pseudorandom integers from a general discrete distribution
G05TEF	22	nagf_rand_int_hypergeom Generates a vector of pseudorandom integers from a hypergeometric distribution
G05TFF	22	nagf_rand_int_log Generates a vector of pseudorandom integers from a logarithmic distribution
G05TGF	22	nagf_rand_int_multinomial Generates a vector of pseudorandom integers from a multinomial distribution
G05THF	22	nagf_rand_int_negbin Generates a vector of pseudorandom integers from a negative binomial distribution
G05TJF	22	nagf_rand_int_poisson Generates a vector of pseudorandom integers from a Poisson distribution
G05TKF	22	nagf_rand_int_poisson_varmean Generates a vector of pseudorandom integers from a Poisson distribution with varying mean
G05TLF	22	nagf_rand_int_uniform Generates a vector of pseudorandom integers from a uniform distribution
G05XAF	24	nagf_rand_bb_init Initializes the Brownian bridge generator
G05XBF	24	nagf_rand_bb Generate paths for a free or non-free Wiener process using the Brownian bridge algorithm
G05XCF	24	nagf_rand_bb_inc_init Initializes the generator which backs out the increments of sample paths generated by a Brownian bridge algorithm
G05XDF	24	nagf_rand_bb_inc Backs out the increments from sample paths generated by a Brownian bridge algorithm
G05XEF	24	nagf_rand_bb_make_bridge_order Creates a Brownian bridge construction order out of a set of input times
G05YJF	21	nagf_rand_quasi_normal Generates a Normal quasi-random number sequence
G05YKF	21	nagf_rand_quasi_lognormal Generates a log-normal quasi-random number sequence
G05YLF	22	nagf_rand_quasi_init Initializes a quasi-random number generator
G05YMF	22	nagf_rand_quasi_uniform Generates a uniform quasi-random number sequence

G05YNF	22	nagf_rand_quasi_init_scrambled Initializes a scrambled quasi-random number generator
G05ZMF	24	nagf_rand_field_1d_user_setup Setup for simulating one-dimensional random fields, user-defined variogram
G05ZNF	24	nagf_rand_field_1d_predef_setup Setup for simulating one-dimensional random fields
G05ZPF	24	nagf_rand_field_1d_generate Generates realizations of a one-dimensional random field
G05ZQF	24	nagf_rand_field_2d_user_setup Setup for simulating two-dimensional random fields, user-defined variogram
G05ZRF	24	nagf_rand_field_2d_predef_setup Setup for simulating two-dimensional random fields, preset variogram
G05ZSF	24	nagf_rand_field_2d_generate Generates realizations of a two-dimensional random field
G05ZTF	24	nagf_rand_field_fracbm_generate Generates realizations of fractional Brownian motion

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