

## NAG Toolbox

### nag\_rand\_dist\_uniform01 (g05sa)

#### 1 Purpose

nag\_rand\_dist\_uniform01 (g05sa) generates a vector of pseudorandom numbers taken from a uniform distribution between 0 and 1.

#### 2 Syntax

```
[state, x, ifail] = nag_rand_dist_uniform01(n, state)
[state, x, ifail] = g05sa(n, state)
```

#### 3 Description

nag\_rand\_dist\_uniform01 (g05sa) generates  $n$  values from a uniform distribution over the half closed interval  $(0, 1]$ .

One of the initialization functions nag\_rand\_init\_repeat (g05kf) (for a repeatable sequence if computed sequentially) or nag\_rand\_init\_nonrepeat (g05kg) (for a non-repeatable sequence) must be called prior to the first call to nag\_rand\_dist\_uniform01 (g05sa).

#### 4 References

Knuth D E (1981) *The Art of Computer Programming (Volume 2)* (2nd Edition) Addison–Wesley

#### 5 Parameters

##### 5.1 Compulsory Input Parameters

1: **n** – INTEGER

$n$ , the number of pseudorandom numbers to be generated.

*Constraint:*  $n \geq 0$ .

2: **state(:)** – INTEGER array

**Note:** the actual argument supplied **must** be the array **state** supplied to the initialization routines nag\_rand\_init\_repeat (g05kf) or nag\_rand\_init\_nonrepeat (g05kg).

Contains information on the selected base generator and its current state.

##### 5.2 Optional Input Parameters

None.

##### 5.3 Output Parameters

1: **state(:)** – INTEGER array

Contains updated information on the state of the generator.

2: **x(n)** – REAL (KIND=nag\_wp) array

The  $n$  pseudorandom numbers from a uniform distribution over the half closed interval  $(0, 1]$ .

- 3: **ifail** – INTEGER  
**ifail** = 0 unless the function detects an error (see Section 5).

## 6 Error Indicators and Warnings

Errors or warnings detected by the function:

**ifail** = 1

Constraint:  $n \geq 0$ .

**ifail** = 2

On entry, **state** vector has been corrupted or not initialized.

**ifail** = -99

An unexpected error has been triggered by this routine. Please contact NAG.

**ifail** = -399

Your licence key may have expired or may not have been installed correctly.

**ifail** = -999

Dynamic memory allocation failed.

## 7 Accuracy

Not applicable.

## 8 Further Comments

None.

## 9 Example

This example prints the first five pseudorandom numbers from a uniform distribution between 0 and 1, generated by `nag_rand_dist_uniform01` (g05sa) after initialization by `nag_rand_init_repeat` (g05kf).

### 9.1 Program Text

```
function g05sa_example

fprintf('g05sa example results\n\n');

% Initialize the base generator to a repeatable sequence
seed = [nag_int(1762543)];
genid = nag_int(1);
subid = nag_int(1);
[state, ifail] = g05kf( ...
                    genid, subid, seed);

% The number of pseudorandom numbers to be generated
n = nag_int(5);

% Generate variates from a Uniform (0,1) distribution
[state, x, ifail] = g05sa( ...
                        n, state);

disp('Variates');
disp(x);
```

## 9.2 Program Results

g05sa example results

Variates  
0.6364  
0.1065  
0.7460  
0.7983  
0.1046

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