NAG C Library Function Document

nag_rngs_logical (g05kec)

1 Purpose
nag_rngs_logical (g05kec) returns a pseudo-random logical value – true with probability \( p \) and false with probability \( (1 - p) \).

2 Specification
Boolean nag_rngs_logical (double \( p \), Integer igen, Integer iseed[], NagError *fail)

3 Description
nag_rngs_logical (g05kec) returns the logical value of the relation
\[ y < p \]
where \( y \) is a pseudo-random number from a uniform distribution over \((0,1)\), generated by nag_rngs_basic (g05kac) using the values of igen and iseed as input to this function.

One of the initialisation functions nag_rngs_init_repeatable (g05kbc) (for a repeatable sequence if computed sequentially) or nag_rngs_init_nonrepeatable (g05kcc) (for a non-repeatable sequence) must be called prior to the first call to nag_rngs_logical (g05kec).

4 References

5 Parameters
1: \( p \) – double 
   \( Input \)
   \( On entry: \) must contain the probability of nag_rngs_logical (g05kec) returning a true result.
   \( Constraint: \) \( 0 \leq p \leq 1 \).

2: igen – Integer 
   \( Input \)
   \( On entry: \) must contain the identification number for the generator to be used to return a pseudo-random number and should remain unchanged following initialisation by a prior call to one of the functions nag_rngs_init_repeatable (g05kbc) or nag_rngs_init_nonrepeatable (g05kcc).

   \( Input/Output \)
   \( On entry: \) contains values which define the current state of the selected generator.
   \( On exit: \) contains updated values defining the new state of the selected generator.

4: fail – NagError * 
   \( Input/Output \)
   The NAG error parameter (see the Essential Introduction).

6 Error Indicators and Warnings
NE_REAL
   \( On entry, \ p < 0.0 \ or \ p > 1.0: \ p = (value). \)
NE_BAD_PARAM
On entry, parameter (value) had an illegal value.

NE_INTERNAL_ERROR
An internal error has occurred in this function. Check the function call and any array sizes. If the
call is correct then please consult NAG for assistance.

7 Accuracy
Not applicable.

8 Further Comments
None.

9 Example
The example program prints the first five pseudo-random logical values generated by nag_rngs_logical
(g05kec) after initialisation by nag_rngs_init_repeatable (g05kbc), when the probability of a TRUE value is
0.6.

9.1 Program Text
/* nag_rngs_logical(g05kec) Example Program. 
* * Copyright 2001 Numerical Algorithms Group.
* * Mark 7, 2001.
*/
#include <stdio.h>
#include <nag.h>
#include <nag_stdlib.h>
#include <nagg05.h>

int main(void)
{
    /* Scalars */
    Integer i, igen;
    Integer exit_status=0;
    Boolean x;
    NagError fail;

    /* Arrays */
    Integer iseed[4];

    INIT_FAIL(fail);
    Vprintf("g05kec Example Program Results\n\n");

    /* Initialise the seed */
    iseed[0] = 1762543;
    iseed[1] = 9324783;
    iseed[2] = 42344;
    iseed[3] = 742355;
    /* igen identifies the stream. */
    igen = 1;
    g05kbc(&igen, iseed);
    for (i = 1; i <= 5; ++i)
    {
        x = g05kec(0.6, igen, iseed, &fail);
        if (fail.code != NE_NOERROR)
        {
            Vprintf("Error from g05kec.\n\n", fail.message);
        }
exit_status = 1;
goto END;
}
Vprintf(" %s\n", x? "T" : "F");
}
END:
return exit_status;
}

9.2 Program Data
None.

9.3 Program Results

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