NAG C Library Function Document

nag_ref_vec_poisson (g05ecc)

1 Purpose

nag_ref_vec_poisson (g05ecc) sets up the reference vector r for a Poisson distribution with mean t.

2 Specification

#include <nag.h>
#include <nag05.h>

void nag_ref_vec_poisson(double t, double **r, NagError *fail)

3 Description

This sets up a reference vector for use in nag_return_discrete (g05eyc). Together these routines produce random numbers from the Poisson distribution defined by:

\[ P(I = i) = \frac{e^{-t} t^i}{i!} \quad \text{if } i = 0, 1, \ldots \]
\[ P(I = i) = 0 \quad \text{otherwise.} \]

The reference array is found using a recurrence relation if t is less than 50 and by Stirling’s formula otherwise.

4 Parameters

1: t – double  \hspace{1cm} Input
   
   On entry: the mean, t, of the distribution.
   
   Constraint: t \geq 0.

2: r – double **  \hspace{1cm} Output
   
   On exit: reference vector for which memory will be allocated internally. If no memory is allocated to r (e.g., when an input error is detected) then r will be NULL on return, otherwise the user should use the NAG macro NAG_FREE to free the storage allocated by r when it is no longer of use.

3: fail – NagError *  \hspace{1cm} Input/Output
   
   The NAG error parameter (see the Essential Introduction).

5 Error Indicators and Warnings

NE_REAL_ARG_LT
   
   On entry, t must not be less than 0.0: t = <value>.

NE_ALLOC_FAIL
   
   Memory allocation failed.

6 Further Comments

6.1 Accuracy

Not applicable.
6.2 References

7 See Also
nag_random_init_repeattable (g05cbc)
nag_random_init_nonrepeattable (g05ccc)
nag_random_exp (g05dbc)
nag_random_normal (g05ddc)
nag_ref_vec_binomial (g05edc)
nag_return_discrete (g05eyc)

8 Example
The example program sets up a reference for a Poisson distribution with mean 2.7 and then prints the first five pseudo-random numbers generated by nag_return_discrete (g05eyc), after initialisation by nag_random_init_repeattable (g05cbc).

8.1 Program Text
/* nag_ref_vec_poisson(g05ecc) Example Program */
* *
* *
* Mark 3 revised, 1994.
*/

#include <nag.h>
#include <stdio.h>
#include <nag_stdlib.h>
#include <nagg05.h>

main()
{
    Integer i, x;
    double *r;
    double t = 2.7;

    Vprintf("g05ecc Example Program Results\n");
g05cbc((Integer)0);
g05ecc(t, &r, NAGERR_DEFAULT);
for (i=1; i<5; i++)
    {
        x = g05eyc(r);
        Vprintf("%5ld\n",x);
    }
NAG_FREE(r);
exits(EXIT_SUCCESS);

8.2 Program Data
None.
8.3 Program Results

g05ecc Example Program Results
  4
  1
  2
  1
  5