nag_return_discrete (g05eyc)

1.   Purpose

nag_return_discrete (g05eyc) returns a pseudo-random integer taken from a discrete distribution defined by a reference vector **r**.

2.   Specification

```
#include <nag.h>
#include <nagg05.h>

Integer nag_return_discrete(double *r)
```

3.   Description

This routine is designed for use in conjunction with other routines in this chapter, which set up the reference vector **r** for specific distributions or according to a distribution specified in terms of the PDF (probability density function) or CDF (cumulative distribution function). See the g05 Chapter Introduction.

The routine generates a random number x from nag_random_continuous_uniform (g05cac) and searches the CDF in **r** for the smallest value y such that $\text{CDF}(y) \geq x$ and $\text{CDF}(y-1) < x$.

4.   Parameters

r

Input: the reference vector for which memory has been allocated by a previous call to another g05 routine. To free this memory the macro NAG_FREE should be added in the users' program after the final call to nag_return_discrete.

5.   Error Indications and Warnings

None.

6.   Further Comments

6.1.   Accuracy

Not applicable.

6.2.   References

Kendall M G and Stuart A (1969) *The Advanced Theory of Statistics (Vol 1)* (3rd Edn) Griffin.
Knuth D E (1981) *The Art of Computer Programming (Vol. 2)* (2nd Edn) Addison-Wesley.

7.   See Also

nag_random_continuous_uniform (g05cac)
nag_random_init_repeatable (g05cbc)
nag_random_init_nonrepeatable (g05ccc)
nag_ref_vec_poisson (g05ecc)
nag_ref_vec_binomial (g05edc)
nag_ref_vec_discrete_pdf_cdf (g05exc)

8.   Example

The example program calls nag_ref_vec_poisson (g05ecc) to set up a reference vector for a Poisson distribution with mean 2.7; it then prints the first five pseudo-random numbers generated by nag_return_discrete after initialisation by nag_random_init_repeatable (g05cbc).

8.1.   Program Text

```
/* nag_return_discrete(g05eyc) Example Program
 *
 * Copyright 1991 Numerical Algorithms Group.
 *
 * Mark 2, 1991.
 *
 * Mark 3 revised, 1994.
 */

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

main()
{

  Integer i;
  double *r;
  double t = 2.7;

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

8.2.   Program Data

None.

8.3.   Program Results

```
g05eyc Example Program Results
    4
    1
    2
    1
    5
```