

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
```
