NAG Fortran Library Routine Document

G05DYF

Note: before using this routine, please read the Users' Note for your implementation to check the interpretation of ***bold italicised*** terms and other implementation-dependent details.

1 Purpose

G05DYF returns a pseudo-random integer taken from a uniform distribution over the interval $[m, n]$.

2 Specification

```
INTEGER FUNCTION G05DYF(M, N)
INTEGER                 M, N
```

3 Description

The distribution of a uniform random variable, I, is given by

$$P(I = i) = \frac{1}{n-m+1} \quad \text{if } m \leq i \leq n,$$

$$P(I = i) = 0 \qquad \text{otherwise,}$$

assuming $m \leq n$. The routine returns the value $m + [(n - m + 1)y]$ where $[\,]$ denotes the integer part, and y is a pseudo-random number from a uniform distribution over (0,1), generated by G05CAF. If $m > n$, the roles of m and n are reversed.

4 References

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

5 Parameters

1: M – INTEGER *Input*
2: N – INTEGER *Input*

On entry: the end-points m and n of the distribution. It is not necessary that $m < n$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

The example program prints the first five pseudo-random integers from a uniform distribution between -5 and 5, generated by G05DYF after initialisation by G05CBF.

The generator mechanism used is selected by an initial call to G05ZAF.

9.1 Program Text

Note: the listing of the example program presented below uses ***bold italicised*** terms to denote precision-dependent details. Please read the Users' Note for your implementation to check the interpretation of these terms. As explained in the Essential Introduction to this manual, the results produced may not be identical for all implementations.

```
*     G05DYF Example Program Text
*     Mark 20 Revised. NAG Copyright 2001.
*     .. Parameters ..
      INTEGER          NOUT
      PARAMETER        (NOUT=6)
*     .. Local Scalars ..
      INTEGER          I, IX
*     .. External Functions ..
      INTEGER          G05DYF
      EXTERNAL         G05DYF
*     .. External Subroutines ..
      EXTERNAL         G05CBF, G05ZAF
*     .. Executable Statements ..
      CALL G05ZAF('O')
      WRITE (NOUT,*) 'G05DYF Example Program Results'
      WRITE (NOUT,*)
      CALL G05CBF(0)
      DO 20 I = 1, 5
*
         IX = G05DYF(-5,5)
*
         WRITE (NOUT,99999) IX
   20 CONTINUE
      STOP
*
99999 FORMAT (1X,I5)
      END
```

9.2 Program Data

None.

9.3 Program Results

```
 G05DYF Example Program Results

     3
    -3
    -1
    -3
     4
```