NAG Fortran Library Routine Document

G05YJF

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

G05YJF generates a Normal quasi-random number sequence in IDIM. One of the initialization routines G05YCF, G05YEF or G05YGF must be called beforehand to determine whether a Faure, Sobol or Neiderreiter sequence should be generated.

2 Specification

```
SUBROUTINE G05YJF (XMEAN, STD, N, QUASI, IREF, IFAIL)
INTEGER            N, IREF(406), IFAIL
double precision   XMEAN(*), STD(*), QUASI(N,*)
```

3 Description

G05YJF generates a Normal quasi-random number sequence.

4 References

None.

5 Parameters

1: XMEAN($*$) – ***double precision*** array *Input*

Note: the dimension of the array XMEAN must be at least IDIM + 1 if IDIM must be odd and at least IDIM otherwise.

On entry: specifies, for each dimension, the mean of the Normal distribution.

2: STD($*$) – ***double precision*** array *Input*

Note: the dimension of the array STD must be at least IDIM + 1 if IDIM must be odd and at least IDIM otherwise.

On entry: specifies, for each dimension, the standard deviation of the Normal distribution.

Constraint: STD(i) ≥ 0.

3: N – INTEGER *Input*

On entry: the number of quasi-random numbers required.

Constraint: N ≥ 1.

4: QUASI(N,$*$) – ***double precision*** array *Output*

Note: the second dimension of the array QUASI must be at least IDIM + 1 if IDIM must be odd and at least IDIM otherwise.

On exit: contains N quasi-random numbers of dimension IDIM.

5: IREF(406) – INTEGER array *Input/Output*

On entry: contains vital information for the generator.

On exit: updated information for the generation of a further set of quasi-random numbers.

IREF must not be changed since the last call to G05YCF, G05YEF or G05YGF.

6: IFAIL – INTEGER *Input/Output*

On entry: IFAIL must be set to 0, −1 or 1. If you are unfamiliar with this parameter you should refer to Chapter P01 for details.

On exit: IFAIL = 0 unless the routine detects an error (see Section 6).

For environments where it might be inappropriate to halt program execution when an error is detected, the value −1 or 1 is recommended. If the output of error messages is undesirable, then the value 1 is recommended. Otherwise, if you are not familiar with this parameter the recommended value is 0. **When the value −1 or 1 is used it is essential to test the value of IFAIL on exit.**

6 Error Indicators and Warnings

If on entry IFAIL = 0 or −1, explanatory error messages are output on the current error message unit (as defined by X04AAF).

Errors or warnings detected by the routine:

IFAIL = 1

On entry, incorrect initialization has been detected.

IFAIL = 3

A standard deviation is negative.

IFAIL = 4

There have been too many calls to the generator.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

This example calls G05YCF to initialize the generator and then G05YJF to generate a sequence of numbers.

9.1 Program Text

```
*     G05YJF Example Program Text
*     Mark 21 Release. NAG Copyright 2004.
*     .. Parameters ..
      INTEGER          NOUT, IDIM, JDIM
      PARAMETER        (NOUT=6,IDIM=4,JDIM=2*IDIM)
*     .. Local Scalars ..
      INTEGER          I, IFAIL, J
*     .. Local Arrays ..
      DOUBLE PRECISION QUASI(5,JDIM), STD(JDIM), XMEAN(JDIM)
      INTEGER          IREF(406)
*     .. External Subroutines ..
      EXTERNAL         G05YCF, G05YJF
*     .. Intrinsic Functions ..
```

```
      INTRINSIC        DBLE
*     .. Executable Statements ..
      WRITE (NOUT,99999) 'G05YJF Example Program Results'
      IFAIL = 0
      DO 20 I = 1, JDIM
         XMEAN(I) = DBLE(I)
         STD(I) = 1.0D0
   20 CONTINUE
*
      CALL G05YCF(IDIM,IREF,IFAIL)
*
      CALL G05YJF(XMEAN,STD,5,QUASI,IREF,IFAIL)
      WRITE (NOUT,99998) ((QUASI(I,J),J=1,IDIM),I=1,5)
*
      STOP
*
99999 FORMAT (1X,A,F20.4)
99998 FORMAT (1X,4F10.4)
      END
```

9.2 Program Data

None.

9.3 Program Results

```
 G05YJF Example Program Results
     0.9601    2.0402    4.8644    4.5595
    -1.8318    4.8417    2.0672    5.1945
    -0.5992    1.1887    1.9207    3.6074
     1.2093    0.6632    3.0283    3.1850
     1.9975    1.8402    3.3998    3.8853
```