

NAG Library Routine Document

G05KEF

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

G05KEF returns a pseudorandom logical value – *true* with probability p and *false* with probability $(1 - p)$.

2 Specification

```
LOGICAL FUNCTION G05KEF(P, IGEN, ISEED, IFAIL)
INTEGER                                IGEN, ISEED(4), IFAIL
double precision                    P
```

3 Description

G05KEF returns the logical value of the relation

$$y < p$$

where y is a pseudorandom number from a uniform distribution over $(0, 1)$, generated by G05KAF using the values of IGEN and ISEED as input to this routine.

One of the initialization routines G05KBF (for a repeatable sequence if computed sequentially) or G05KCF (for a non-repeatable sequence) must be called prior to the first call to G05KEF.

4 References

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

5 Parameters

- 1: P – ***double precision*** *Input*
On entry: must contain the probability of G05KEF returning .TRUE..
Constraint: $0.0 \leq P \leq 1.0$.
- 2: IGEN – INTEGER *Input*
On entry: must contain the identification number for the generator to be used to return a pseudorandom number and should remain unchanged following initialization by a prior call to G05KBF or G05KCF.
- 3: ISEED(4) – INTEGER array *Communication Array*
On entry: contains values which define the current state of the selected generator.
On exit: contains updated values defining the new state of the selected generator.
- 4: 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 Section 3.3 in the Essential Introduction 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, $P < 0$,
or $P > 1$.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

This example prints the first five pseudorandom logical values generated by G05KEF after initialization by G05KBF, when the probability of a TRUE value is 0.6 .

9.1 Program Text

```
*      G05KEF Example Program Text
*      Mark 20 Release. NAG Copyright 2001.
*      .. Parameters ..
      INTEGER          NOUT
      PARAMETER        (NOUT=6)
*      .. Local Scalars ..
      INTEGER          I, IFAIL, IGEN
      LOGICAL          X
*      .. Local Arrays ..
      INTEGER          ISEED(4)
*      .. External Functions ..
      LOGICAL          A00ACF, G05KEF
      EXTERNAL         A00ACF, G05KEF
*      .. External Subroutines ..
      EXTERNAL         G05KBF
*      .. Executable Statements ..
      WRITE (NOUT,*) 'G05KEF Example Program Results'
      WRITE (NOUT,*)
      IF (A00ACF()) THEN
*      Initialize the seed
      ISEED(1) = 1762543
      ISEED(2) = 9324783
      ISEED(3) = 42344
      ISEED(4) = 742355
*      IGEN identifies the stream.
      IGEN = 1
      CALL G05KBF(IGEN, ISEED)
*
      IFAIL = 0
      DO 20 I = 1, 5
*

```

```
      X = G05KEF(0.6D0,IGEN,ISEED,IFAIL)
*
      WRITE (NOUT,99999) X
20    CONTINUE
      ELSE
        WRITE (NOUT,*) ' ** No valid licence key was found'
      END IF
*
99999 FORMAT (1X,L5)
      END
```

9.2 Program Data

None.

9.3 Program Results

G05KEF Example Program Results

```
T
F
T
F
F
```
