

NAG Toolbox for MATLAB

g05dk

1 Purpose

g05dk returns a pseudo-random real number taken from the F (or Fisher's variance ratio) distribution with m and n degrees of freedom.

2 Syntax

```
[result, ifail] = g05dk(m, n)
```

3 Description

The distribution has PDF (probability density function)

$$f(x) = \frac{\left(\frac{m+n-2}{2}\right)! x^{\frac{1}{2}m-1}}{\left(\frac{1}{2}m-1\right)! \left(\frac{1}{2}n-1\right)! \left(1 + \frac{m}{n}x\right)^{\frac{1}{2}(m+n)}} \times \left(\frac{m}{n}\right)^{\frac{1}{2}m} \quad \text{if } x > 0,$$

$$f(x) = 0 \quad \text{otherwise.}$$

g05dk returns the value

$$\frac{ny}{mz}$$

where y and z are generated by g05ff from gamma distributions with parameters $(\frac{1}{2}m, 2)$ and $(\frac{1}{2}n, 2)$ respectively (i.e., from χ^2 -distributions with m and n degrees of freedom).

4 References

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

5 Parameters

5.1 Compulsory Input Parameters

1: **m – int32 scalar**

m , the first degree of freedom of the distribution.

Constraint: $m > 0$.

2: **n – int32 scalar**

n , the second degree of freedom of the distribution.

Constraint: $n > 0$.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **result** – double scalar

The result of the function.

2: **ifail** – int32 scalar

0 unless the function detects an error (see Section 6).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

ifail = 1

On entry, **m** < 1.

ifail = 2

On entry, **n** < 1.

7 Accuracy

Not applicable.

8 Further Comments

The time taken by g05dk increases with *m* and *n*.

9 Example

```
m = int32(2);
n = int32(3);
g05za('O');
g05cb(int32(0));
[result, ifail] = g05dk(m, n)
```

```
result =
    0.1252
ifail =
    0
```