

NAG Toolbox for MATLAB

g05fb

1 Purpose

g05fb generates a vector of pseudo-random numbers taken from a (negative) exponential distribution with mean a .

2 Syntax

`[x] = g05fb(a, n)`

3 Description

The distribution has PDF (probability density function)

$$f(x) = \frac{1}{a}e^{-x/a} \quad \text{if } x > 0,$$

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

g05fb returns the values

$$x_i = -a \ln y_i$$

where y_i are the next n numbers generated by a uniform $(0, 1)$ generator.

If computing sequentially and using the same generator, g05fb always generates exactly the same pseudo-random numbers as would n consecutive calls of g05db, but on many machines is likely to be much faster.

4 References

Kendall M G and Stuart A 1969 *The Advanced Theory of Statistics (Volume 1)* (3rd Edition) Griffin

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

5 Parameters

5.1 Compulsory Input Parameters

1: **a – double scalar**

The parameter a of the distribution. If **a** is negative, its absolute value is used.

2: **n – int32 scalar**

n , the number of pseudo-random numbers to be generated.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **x(n) – double array**

The n pseudo-random numbers from the specified exponential distribution.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

```
a = 2;  
n = int32(5);  
g05za('O');  
g05cb(int32(0));  
[x] = g05fb(a, n)
```

```
x =  
    0.4585  
    2.9769  
    1.9816  
    2.9830  
    0.2585
```