

## nag\_random\_exp (g05dbc)

### 1. Purpose

`nag_random_exp (g05dbc)` returns a pseudo-random real number taken from a (negative) exponential distribution with mean  $a$ .

### 2. Specification

```
#include <nag.h>
#include <nagg05.h>
```

```
double nag_random_exp(double a)
```

### 3. Description

The distribution has PDF (probability density function)

$$\begin{aligned} f(x) &= \frac{1}{a} e^{-x/a} & \text{if } x > 0 \\ f(x) &= 0 & \text{otherwise.} \end{aligned}$$

The function returns the value  $-a \ln y$ , where  $y$  is a pseudo-random number from a uniform distribution over (0,1), generated by `nag_random_continuous_uniform (g05cac)`.

### 4. Parameters

**a**

Input: the parameter  $a$  of the distribution. If **a** is negative, its absolute value is used.

### 5. Error Indications and Warnings

None.

### 6. Further Comments

#### 6.1. References

Kendall M G and Stuart A (1969) *The Advanced Theory of Statistics (Vol 1)* (3rd Edn) Griffin.  
Knuth D E (1981) *The Art of Computer Programming (Vol 2)* (2nd Edn) Addison-Wesley.

### 7. See Also

`nag_random_continuous_uniform (g05cac)`

### 8. Example

The example program prints the first five pseudo-random real numbers from a negative exponential distribution with mean 2.0, generated by `nag_random_exp` after initialisation by `nag_random_init_repeatable (g05cbc)`.

### 8.1. Program Text

```
/* nag_random_exp(g05dbc) Example Program
 *
 * Copyright 1990 Numerical Algorithms Group.
 *
 * Mark 1, 1990.
 */

#include <nag.h>
#include <stdio.h>
#include <nag_stdlib.h>
#include <nagg05.h>

main()
{
    Integer seed = 0;
    Integer i;

    Vprintf("g05dbc Example Program Results\n");
    g05cbc(seed);
    for (i=1; i<=5; i++)
        Vprintf("%10.4f\n",g05dbc(2.0));
    exit(EXIT_SUCCESS);
}
```

### 8.2. Program Data

None.

### 8.3. Program Results

```
g05dbc Example Program Results
  0.4585
  2.9769
  1.9816
  2.9830
  0.2585
```

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