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)

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

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
```