

## nag\_random\_normal (g05ddc)

### 1. Purpose

**nag\_random\_normal (g05ddc)** returns a pseudo-random real number taken from a Normal (Gaussian) distribution with mean  $a$  and standard deviation  $b$ .

### 2. Specification

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

```
double nag_random_normal(double a, double b)
```

### 3. Description

The distribution has PDF (probability density function)

$$f(x) = \frac{1}{b\sqrt{2\pi}} \exp\left(-\frac{(x-a)^2}{2b^2}\right).$$

The function uses the method of Brent (1974).

### 4. Parameters

**a**

Input: the mean  $a$ , of the distribution.

**b**

Input: the standard deviation  $b$ , of the distribution. If **b** is negative, the distribution of the generated numbers – though not the actual sequence – is the same as if the absolute value of **b** were used.

### 5. Error Indications and Warnings

None.

### 6. Further Comments

#### 6.1. References

Brent R P (1974) Algorithm 488 *Commun. ACM* p 704.

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

None.

### 8. Example

The example program prints the first five pseudo-random real numbers from a Normal distribution with mean 1.0 and standard deviation 1.5, generated by `nag_random_normal` after initialisation by `nag_random_init_repeatabl` (g05cbc).

### 8.1. Program Text

```
/* nag_random_normal(g05ddc) 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("g05ddc Example Program Results\n");
    g05cbc(seed);
    for (i=1; i<=5; i++)
        Vprintf("%10.4f\n",g05ddc(1.0,1.5));
    exit(EXIT_SUCCESS);
}
```

### 8.2. Program Data

None.

### 8.3. Program Results

```
g05ddc Example Program Results
  1.8045
  2.9393
  3.3701
  0.9602
  3.2751
```

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