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_repeatable (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
```