

NAG Toolbox for MATLAB

g05dh

1 Purpose

g05dh returns a pseudo-random real number taken from a χ^2 -distribution with n degrees of freedom.

2 Syntax

```
[result, ifail] = g05dh(n)
```

3 Description

The distribution has PDF (probability density function)

$$f(x) = \frac{x^{\frac{1}{2}n-1} \times e^{-x/2}}{2^{\frac{1}{2}n} \times (\frac{1}{2}n - 1)!} \quad \text{if } x > 0;$$

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

This is the same as a gamma distribution with parameters $\frac{1}{2}n$ and 2; g05dh calls g05ff with these parameters.

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: **n – int32 scalar**

n , the number of degrees of freedom of the distribution.

Constraint: $n \geq 1$.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **result – double scalar**

The result of the function.

2: **ifail – int32 scalar**

0 unless the function detects an error (see Section 6).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

ifail = 1

On entry, $n < 1$.

7 Accuracy

Not applicable.

8 Further Comments

The time taken by g05dh increases with n .

9 Example

```
n = int32(5);  
g05za('O');  
g05cb(int32(0));  
[result, ifail] = g05dh(n)
```

```
result =  
    6.7995  
ifail =  
        0
```