

NAG Toolbox for MATLAB

g05ec

1 Purpose

g05ec sets up the reference vector **r** for a Poisson distribution with mean t .

2 Syntax

```
[r, ifail] = g05ec(t, nr)
```

3 Description

g05ec sets up a reference vector for use in g05ey. Together these functions produce random numbers from the distribution defined by:

$$P(I = i) = \frac{t^i e^{-t}}{i!} \quad \text{if} \quad i = 0, 1, \dots,$$

$$P(I = i) = 0 \quad \text{otherwise.}$$

The reference array is found using a recurrence relation if t is less than 50 and by Stirling's formula otherwise.

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: **t – double scalar**
 t , the mean of the distribution.
Constraint: $t \geq 0$.

2: **nr – int32 scalar**
Suggested value: approximately $20 + 20 \times \sqrt{t}$ (for optimum efficiency in g05ey).
Constraint: $nr > \left(\text{int} \left[t + 7.15\sqrt{t} + 8.5 \right] - \max \left(0, \text{int} \left[t - 7.15\sqrt{t} \right] \right) + 4 \right)$.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **r(nr) – double array**
The reference vector.

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, **t** < 0.

ifail = 2

On entry, **nr** is too small (see Section 5).

7 Accuracy

Not applicable.

8 Further Comments

The time taken by g05ec increases with **nr**.

9 Example

```
t = 2.7;  
nr = int32(30);  
g05za('O');  
g05cb(int32(0));  
[r, ifail] = g05ec(t, nr)
```

```
r =  
 5.0000  
-8.5000  
 8.5000  
 9.5000  
10.5000  
11.5000  
12.5000  
 0.0672  
 0.2487  
 0.4936  
 0.7141  
 0.8629  
 0.9433  
 0.9794  
 0.9934  
 0.9981  
 0.9995  
 0.9999  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000  
 1.0000
```

```
ifail =  
      0
```
