NAG Toolbox for MATLAB

g05ez

1 Purpose

g05ez generates a pseudo-random multivariate Normal vector taken from a distribution described by a reference vector set up by g05ea.

2 Syntax

```
[z, ifail] = g05ez(n, r, 'nr', nr)
```

3 Description

g05ez is designed for use in conjunction with g05ea. The description of g05ea should be referred to for a specification of the operation of these two functions.

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 dimension of the distribution. This must be the same as was set up in the reference vector by g05ea.

Constraint: $\mathbf{n} \geq 1$.

2: **r(nr) – double array**

The reference vector as set up by g05ea.

5.2 Optional Input Parameters

1: **nr – int32 scalar**

Default: The dimension of the array **r**.

It must be the same as the value of **nr** specified in the call to g05ea to set up the reference vector.

Constraint: $\mathbf{nr} \geq (\mathbf{n}+1)(\mathbf{n}+2)/2$.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **z(n) – double array**

The pseudo-random multivariate Normal vector generated by g05ez.

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, $\mathbf{n} < 1$,
or $\mathbf{n}$ is not the same as when $\mathbf{r}$ was set up by g05ea. This is likely to be due to corruption of $\mathbf{r}$.

ifail $= 2$

On entry, $\mathbf{nr} < (\mathbf{n}+1)(\mathbf{n}+2)/2$.

7 Accuracy

The accuracy is discussed in g05ea.

8 Further Comments

The time taken by g05ez is of the order

$$a + b \times n + c \times n^2$$

where a and b are appreciably (say $10 - -20$ times) larger than c.

9 Example

```
n = int32(2);
r = [2.5;
     1;
     2;
     1.435270009440733;
     0.6967330142916175;
     1.604544516925634];
g05za('O');
g05cb(int32(0));
[z, ifail] = g05ez(n, r)
```

```
z =
    1.7697
    4.4481
ifail =
           0
```