

NAG Toolbox for MATLAB

g01al

1 Purpose

g01al calculates a five-point summary for a single sample.

2 Syntax

```
[res, ifail] = g01al(x, 'n', n)
```

3 Description

g01al calculates the minimum, lower hinge, median, upper hinge and the maximum of a sample of n observations.

The data consist of a single sample of n observations denoted by x_i and let z_i , for $i = 1, 2, \dots, n$, represent the sample observations sorted into ascending order.

Let $m = \frac{n}{2}$ if n is even and $\frac{(n+1)}{2}$ if n is odd,

and $k = \frac{m}{2}$ if m is even and $\frac{(m+1)}{2}$ if m is odd.

Then we have

Minimum	$= z_1,$	
Maximum	$= z_n,$	
Median	$= z_m$	if n is odd,
	$= \frac{z_m + z_{m+1}}{2}$	if n is even,
Lower hinge	$= z_k$	if m is odd,
	$= \frac{z_k + z_{k+1}}{2}$	if m is even,
Upper hinge	$= z_{n-k+1}$	if m is odd,
	$= \frac{z_{n-k} + z_{n-k+1}}{2}$	if m is even.

4 References

Erickson B H and Nosanchuk T A 1985 *Understanding Data* Open University Press, Milton Keynes

Tukey J W 1977 *Exploratory Data Analysis* Addison–Wesley

5 Parameters

5.1 Compulsory Input Parameters

1: **x(n)** – double array

The sample observations, $x_1, x_2, \dots, x_n$.

5.2 Optional Input Parameters

1: **n** – int32 scalar

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

n , number of observations in the sample.

Constraint: $n \geq 5$.

5.3 Input Parameters Omitted from the MATLAB Interface

iwrk

5.4 Output Parameters

1: **res(5) – double array**

res contains the five-point summary as follows:

res(1) the minimum;
res(2) the lower hinge;
res(3) the median;
res(4) the upper hinge;
res(5) the maximum.

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, $n < 5$.

7 Accuracy

The computations are stable.

8 Further Comments

The time taken by g01al is proportional to n .

9 Example

```
x = [12;  
     9;  
     2;  
     5;  
     6;  
     8;  
     2;  
     7;  
     3;  
     1;  
    11;  
    10];  
[res, ifail] = g01al(x)  
  
res =  
    1.0000  
    2.5000  
    6.5000  
    9.5000
```

```
      12.0000  
ifail =  
      0
```
