

## NAG Toolbox

### nag\_blast\_dmin\_val (f16jp)

## 1 Purpose

nag\_blast\_dmin\_val (f16jp) computes the smallest component of a real vector, along with the index of that component.

## 2 Syntax

```
[k, r] = nag_blast_dmin_val(n, x, incx)
[k, r] = f16jp(n, x, incx)
```

## 3 Description

nag\_blast\_dmin\_val (f16jp) computes the smallest component,  $r$ , of an  $n$ -element real vector  $x$ , and determines the smallest index,  $k$ , such that

$$r = x_k = \min_j x_j.$$

## 4 References

Basic Linear Algebra Subprograms Technical (BLAST) Forum (2001) *Basic Linear Algebra Subprograms Technical (BLAST) Forum Standard* University of Tennessee, Knoxville, Tennessee  
<http://www.netlib.org/blas/blast-forum/blas-report.pdf>

## 5 Parameters

### 5.1 Compulsory Input Parameters

1: **n** – INTEGER

$n$ , the number of elements in  $x$ .

2: **x(1 + (n - 1) × |incx|)** – REAL (KIND=nag\_wp) array

The vector  $x$ . Element  $x_i$  is stored in  $\mathbf{x}((i - 1) \times |\mathbf{incx}| + 1)$ , for  $i = 1, 2, \dots, n$ .

3: **incx** – INTEGER

The increment in the subscripts of  $\mathbf{x}$  between successive elements of  $x$ .

*Constraint:*  $\mathbf{incx} \neq 0$ .

### 5.2 Optional Input Parameters

None.

### 5.3 Output Parameters

1: **k** – INTEGER

$k$ , the index, from the set  $\{1, 2, \dots, n\}$ , of the smallest component of  $x$ . If  $\mathbf{n} \leq 0$  on input then  $\mathbf{k}$  is returned as 0.

2:     **r** – REAL (KIND=nag\_wp)

*r*, the smallest component of *x*. If **n** ≤ 0 on input then **r** is returned as 0.0.

## 6 Error Indicators and Warnings

If **incx** = 0, an error message is printed and program execution is terminated.

## 7 Accuracy

The BLAS standard requires accurate implementations which avoid unnecessary over/underflow (see Section 2.7 of Basic Linear Algebra Subprograms Technical (BLAST) Forum (2001)).

## 8 Further Comments

None.

## 9 Example

This example computes the smallest component and index of that component for the vector

$$x = (1, 10, 11, -2, 9)^T.$$

### 9.1 Program Text

```
function f16jp_example

fprintf('f16jp example results\n\n');

% min real and location
n    = nag_int(5);
x    = [1    10    11    -2    9];
incx = nag_int(1);

[xloc, xmin] = f16jp(n, x, incx);

fprintf('min());
fprintf('%5.1f',x);
fprintf('') = x(%4d) = %5.1f\n', xloc, xmin);
```

### 9.2 Program Results

```
f16jp example results

min( 1.0 10.0 11.0 -2.0  9.0) = x(    4) =  -2.0
```

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