

## NAG Toolbox

### nag\_blast\_imax\_val (f16dn)

#### 1 Purpose

nag\_blast\_imax\_val (f16dn) computes the largest component of an integer vector, along with the index of that component.

#### 2 Syntax

```
[k, ii] = nag_blast_imax_val(n, x, incx)
```

```
[k, ii] = f16dn(n, x, incx)
```

#### 3 Description

nag\_blast\_imax\_val (f16dn) computes the largest component,  $i$ , of an  $n$ -element integer vector  $x$ , and determines the smallest index,  $k$ , such that

$$i = x_k = \max_j x_j.$$

#### 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|)** – INTEGER array

The  $n$ -element vector  $x$ .

If **incx** > 0,  $x_i$  must be stored in **x**(( $i - 1$ ) × |**incx**| + 1), for  $i = 1, 2, \dots, \mathbf{n}$ .

If **incx** < 0,  $x_i$  must be stored in **x**(( $\mathbf{n} - i$ ) × |**incx**| + 1), for  $i = 1, 2, \dots, \mathbf{n}$ .

Intermediate elements of **x** are not referenced. If **n** = 0, **x** is not referenced.

3: **incx** – INTEGER

The increment in the subscripts of **x** between successive elements of  $x$ .

*Constraint:* **incx** ≠ 0.

##### 5.2 Optional Input Parameters

None.

### 5.3 Output Parameters

1: **k** – INTEGER

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

2: **ii** – INTEGER

$i$ , the largest component of  $x$ . If  $\mathbf{n} \leq 0$  on input then **ii** is returned as 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 largest component and index of that component for the vector

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

### 9.1 Program Text

```
function f16dn_example
fprintf('f16dn example results\n\n');

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

[xloc, xmax] = f16dn(n, x, incx);

fprintf('max(');
fprintf('%4d', x);
fprintf(') = x(%4d) = %5d\n', xloc, xmax);
```

### 9.2 Program Results

```
f16dn example results
max( 1 10 11 -2 9) = x( 3) = 11
```

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