

NAG Library Routine Document

F16JNF (BLAS_DMAX_VAL)

Note: before using this routine, please read the Users' Note for your implementation to check the interpretation of *bold italicised* terms and other implementation-dependent details.

1 Purpose

F16JNF (BLAS_DMAX_VAL) computes the largest component of a real vector, along with the index of that component.

2 Specification

```
SUBROUTINE F16JNF (N, X, INCX, K, R)
  INTEGER          N, INCX, K
  REAL (KIND=nag_wp) X(1+(N-1)*ABS(INCX)), R
```

The routine may be called by its BLAST name *blas_dmax_val*.

3 Description

F16JNF (BLAS_DMAX_VAL) computes the largest component, r , of an n -element real vector x , and determines the smallest index, k , such that

$$r = x_k = \max_j x_j.$$

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

- | | | |
|----|---|---------------|
| 1: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of elements in x . | |
| 2: | $X(1 + (N - 1) \times INCX)$ – REAL (KIND=nag_wp) array | <i>Input</i> |
| | <i>On entry:</i> the vector x . Element x_i is stored in $X((i - 1) \times INCX + 1)$, for $i = 1, 2, \dots, n$. | |
| 3: | INCX – INTEGER | <i>Input</i> |
| | <i>On entry:</i> the increment in the subscripts of X between successive elements of x . | |
| | <i>Constraint:</i> $INCX \neq 0$. | |
| 4: | K – INTEGER | <i>Output</i> |
| | <i>On exit:</i> k , the index, from the set $\{1, 1 + INCX , \dots, 1 + (N - 1) \times INCX \}$, of the largest component of x . If $N \leq 0$ on input then K is returned as 0. | |
| 5: | R – REAL (KIND=nag_wp) | <i>Output</i> |
| | <i>On exit:</i> r , the largest component of x . If $N \leq 0$ 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 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

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

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

10.1 Program Text

```

Program f16jnfe
!      F16JNF Example Program Text
!
!      Mark 25 Release. NAG Copyright 2014.
!
!      .. Use Statements ..
!      Use nag_library, Only: blas_dmax_val, nag_wp
!      .. Implicit None Statement ..
!      Implicit None
!      .. Parameters ..
!      Integer, Parameter          :: nin = 5, nout = 6
!      .. Local Scalars ..
!      Real (Kind=nag_wp)          :: r
!      Integer                     :: i, incx, k, n
!      .. Local Arrays ..
!      Real (Kind=nag_wp), Allocatable :: x(:)
!      .. Intrinsic Procedures ..
!      Intrinsic                   :: abs
!      .. Executable Statements ..
!      Write (nout,*) 'F16JNF Example Program Results'
!
!      Skip heading in data file
!      Read (nin,*)
!
!      Read (nin,*) n, incx
!      Allocate (x(1+(n-1)*abs(incx)))
!
!      Read (nin,*)(x(i),i=1,1+(n-1)*abs(incx),incx)
!
!      Find K = ARGMAX(X) and R = MAX(X).
!
!      Call blas_dmax_val(n,x,incx,k,r)
!
!      Write (nout,*)
!      Write (nout,99999) k

```

```
Write (nout,99998) r
99999 Format (1X,'Index of largest component of X is',I3)
99998 Format (1X,'Largest component of X is',F12.5)
End Program f16jnfe
```

10.2 Program Data

```
F16JNF Example Program Data
  5   1                               : N and INCX
 1.0 10.0 11.0 -2.0 9.0              : Array X
```

10.3 Program Results

F16JNF Example Program Results

```
Index of largest component of X is 3
Largest component of X is    11.00000
```
