

NAG Library Routine Document

F16JPF (BLAS_DMIN_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

F16JPF (BLAS_DMIN_VAL) computes the smallest component of a real vector, along with the index of that component.

2 Specification

```
SUBROUTINE F16JPF (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_dmin_val*.

3 Description

F16JPF (BLAS_DMIN_VAL) 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 Arguments

- 1: N – INTEGER *Input*
On entry: n , the number of elements in x .
- 2: X(1 + (N – 1) × |INCX|) – REAL (KIND=nag_wp) array *Input*
On entry: the n -element vector x .
If $\text{INCX} > 0$, x_i must be stored in $X((i - 1) \times \text{INCX} + 1)$, for $i = 1, 2, \dots, N$.
If $\text{INCX} < 0$, x_i must be stored in $X((N - i) \times |\text{INCX}| + 1)$, for $i = 1, 2, \dots, N$.
Intermediate elements of X are not referenced. If $N = 0$, X is not referenced.
- 3: INCX – INTEGER *Input*
On entry: the increment in the subscripts of X between successive elements of x .
Constraint: $\text{INCX} \neq 0$.
- 4: K – INTEGER *Output*
On exit: k , the index, from the set $\{1, 2, \dots, N\}$, of the smallest component of x . If $N \leq 0$ on input then K is returned as 0.

5: R – REAL (KIND=nag_wp)

Output

On exit: r , the smallest 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

F16JPF (BLAS_DMIN_VAL) is not threaded in any implementation.

9 Further Comments

None.

10 Example

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

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

10.1 Program Text

```

Program f16jpf
!
!   F16JPF Example Program Text
!
!   Mark 26 Release. NAG Copyright 2016.
!
!   .. Use Statements ..
!   Use nag_library, Only: blas_dmin_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, ix, k, n
!   .. Local Arrays ..
!   Real (Kind=nag_wp), Allocatable :: x(:)
!   .. Intrinsic Procedures ..
!   Intrinsic                  :: abs
!   .. Executable Statements ..
!   Write (nout,*) 'F16JPF Example Program Results'
!
!   Skip heading in data file
!   Read (nin,*)
!
!   Read (nin,*) n, incx
!   Allocate (x(1+(n-1)*abs(incx)))
!
!   Read the vector x and store forwards or backwards
!   as determined by incx.
!   If (incx>0) Then
!     ix = 1
!   Else
!     ix = 1 - (n-1)*incx
!   End If

```

```

      Do i = 1, n
        Read (nin,*) x(ix)
        ix = ix + incx
      End Do

!      Find k = argmin(x) and r = min(x).

      Call blas_dmin_val(n,x,incx,k,r)

      Write (nout,*)
      Write (nout,99999) k
      Write (nout,99998) r

99999 Format (1X,'Index of smallest component of x is',I3)
99998 Format (1X,'Smallest component of x is',F12.5)
      End Program f16jpf

```

10.2 Program Data

F16JPF Example Program Data

```

5   1                               : n and incx
1.0
10.0
11.0
-2.0
9.0                                 : Vector x

```

10.3 Program Results

F16JPF Example Program Results

```

Index of smallest component of x is 4
Smallest component of x is -2.00000

```
