

NAG Library Routine Document

F16JSF (BLAS_ZAMAX_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

F16JSF (BLAS_ZAMAX_VAL) computes, with respect to absolute value, the largest component of a complex vector, along with the index of that component.

2 Specification

```
SUBROUTINE F16JSF ( N, X, INCX, K, R)
INTEGER                N, INCX, K
REAL (KIND=nag_wp)    R
COMPLEX (KIND=nag_wp) X(1+(N-1)*ABS(INCX))
```

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

3 Description

F16JSF (BLAS_ZAMAX_VAL) computes, with respect to absolute value, the largest component, r , of an n -element complex vector x , and determines the smallest index, k , such that

$$r = |\operatorname{Re} x_k| + |\operatorname{Im} x_k| = \max_j |\operatorname{Re} x_j| + |\operatorname{Im} x_j|.$$

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: | $X(1 + (N - 1) \times INCX)$ – COMPLEX (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 with respect to absolute value. 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 with respect to absolute value. 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 Further Comments

None.

9 Example

This example computes the largest component with respect to absolute value and index of that component for the vector

$$x = (-4 + 2.1i, 3.7 + 4.5i, -6 + 1.2i)^T.$$

9.1 Program Text

```

Program f16jsfe

!      F16JSF Example Program Text

!      Mark 24 Release. NAG Copyright 2012.

!      .. Use Statements ..
      Use nag_library, Only: blas_zamax_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 ..
      Complex (Kind=nag_wp), Allocatable :: x(:)
!      .. Intrinsic Procedures ..
      Intrinsic                  :: abs
!      .. Executable Statements ..
      Write (nout,*) 'F16JSF 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(ABS(Re(X))+ABS(Im(X))) and
!              R = MAX(ABS(Re(X))+ABS(Im(X))).

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

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

99999 Format (1X,'Index of absolutely largest component of X is',I3)
99998 Format (1X,'Absolutely largest value is',F12.5)
      End Program f16jsfe

```

9.2 Program Data

F16JSF Example Program Data

3 1

(-4., 2.1) (3.7, 4.5) (-6., 1.2)

: N and INCX

: X

9.3 Program Results

F16JSF Example Program Results

Index of absolutely largest component of X is 2

Absolutely largest value is 8.20000
