

# NAG Library Routine Document

## F16DLF

**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

F16DLF sums the elements of an integer vector.

### 2 Specification

```
FUNCTION F16DLF (N, X, INCX)
  INTEGER F16DLF
  INTEGER N, X(1+(N-1)*ABS(INCX)), INCX
```

### 3 Description

F16DLF returns the sum

$$x_1 + x_2 + \cdots + x_n$$

of the elements of an  $n$ -element integer vector  $x$ , via the function name.

If  $N \leq 0$  on entry, F16DLF immediately returns the value 0.

### 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   | <i>Input</i> |
|    | <i>On entry:</i> $n$ , the number of elements in $x$ .  |              |
| 2: | $X(1 + (N - 1) \times  INCX )$ – INTEGER array  | <i>Input</i> |
|    | <i>On entry:</i> the $n$ -element vector $x$ .  |              |
|    | If $INCX > 0$ , $x_i$ must be stored in $X((i - 1) \times INCX + 1)$ , for $i = 1, 2, \dots, N$ .   |              |
|    | If $INCX < 0$ , $x_i$ must be stored in $X((N - i) \times  INCX  + 1)$ , for $i = 1, 2, \dots, N$ . |              |
|    | Intermediate elements of $X$ are not referenced. If $N = 0$ , $X$ is not referenced.                |              |
| 3: | INCX – INTEGER  | <i>Input</i> |
|    | <i>On entry:</i> the increment in the subscripts of $X$ between successive elements of $x$ .        |              |
|    | <i>Constraint:</i> $INCX \neq 0$ .  |              |

### 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

F16DLF is not threaded in any implementation.

## 9 Further Comments

None.

## 10 Example

This example computes the sum of the elements of

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

### 10.1 Program Text

```

Program f16dlfe

!      F16DLF Example Program Text

!      Mark 26 Release. NAG Copyright 2016.

!      .. Use Statements ..
      Use nag_library, Only: f16dlf
!      .. Implicit None Statement ..
      Implicit None
!      .. Parameters ..
      Integer, Parameter          :: nin = 5, nout = 6
!      .. Local Scalars ..
      Integer                    :: i, incx, ix, n, sumval
!      .. Local Arrays ..
      Integer, Allocatable       :: x(:)
!      .. Intrinsic Procedures ..
      Intrinsic                  :: abs
!      .. Executable Statements ..
      Write (nout,*) 'F16DLF 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

!      Sum the elements of x

      sumval = f16dlf(n,x,incx)

```

```
      Write (nout,*)  
      Write (nout,99999) sumval  
  
99999 Format (1X,'Sum of elements of x is',I5)  
      End Program f16dlfe
```

## 10.2 Program Data

F16DLF Example Program Data

```
5      1      : n and incx  
1  
10  
11  
-2  
9      : Vector x
```

## 10.3 Program Results

F16DLF Example Program Results

```
Sum of elements of x is    29
```

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