

A02ABF – NAG Fortran Library Routine Document

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

A02ABF returns the value of the modulus of the complex number $x = (x_r, x_i)$.

2 Specification

```
real FUNCTION A02ABF(XR, XI)
real                XR, XI
```

3 Description

The function evaluates $\sqrt{x_r^2 + x_i^2}$ by using $a\sqrt{1 + (\frac{b}{a})^2}$ where a is the larger of x_r and x_i , and b is the smaller of x_r and x_i . This ensures against unnecessary overflow and loss of accuracy when calculating $(x_r^2 + x_i^2)$.

4 References

- [1] Wilkinson J H and Reinsch C (1971) *Handbook for Automatic Computation II, Linear Algebra* Springer-Verlag

5 Parameters

- 1: XR — *real* *Input*
 2: XI — *real* *Input*
On entry: x_r and x_i , the real and imaginary parts of x , respectively.

6 Error Indicators and Warnings

None.

7 Accuracy

The result should be correct to *machine precision*.

8 Further Comments

None.

9 Example

To find the modulus of $-1.7 + 2.6i$.

9.1 Program Text

```
*      A02ABF Example Program Text
*      Mark 14 Revised.  NAG Copyright 1989.
*      .. Parameters ..
      INTEGER          NIN, NOUT
      PARAMETER       (NIN=5,NOUT=6)
*      .. Local Scalars ..
      real            XI, XR, Y
*      .. External Functions ..
      real            A02ABF
      EXTERNAL        A02ABF
*      .. Executable Statements ..
      WRITE (NOUT,*) 'A02ABF Example Program Results'
*      Skip heading in data file
      READ (NIN,*)
      READ (NIN,*) XR, XI
      Y = A02ABF(XR,XI)
      WRITE (NOUT,*)
      WRITE (NOUT,*) '  XR    XI      Y'
      WRITE (NOUT,99999) XR, XI, Y
      STOP
*
99999 FORMAT (1X,2F6.1,F9.4)
      END
```

9.2 Program Data

```
A02ABF Example Program Data
-1.7 2.6
```

9.3 Program Results

```
A02ABF Example Program Results
```

```
XR    XI      Y
-1.7  2.6    3.1064
```
