

NAG Library Routine Document

A02ABF

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

double precision FUNCTION A02ABF(XR, XI)
double precision XR, XI

3 Description

The function evaluates $\sqrt{x_r^2 + x_i^2}$ by using $a\sqrt{1 + \left(\frac{b}{a}\right)^2}$ 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

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

5 Parameters

1:	XR – <i>double precision</i>	<i>Input</i>
2:	XI – <i>double precision</i>	<i>Input</i>

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

This example finds 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 ..
      DOUBLE PRECISION XI, XR, Y
*      .. External Functions ..
      DOUBLE PRECISION A02ABF
      EXTERNAL          A02ABF
*      .. Executable Statements ..
      WRITE (NOUT,*) 'A02ABF Example Program Results'
      WRITE (NOUT,*)
*      Skip heading in data file
      READ (NIN,*)
      READ (NIN,*) XR, XI
*
*      Return absolute value of (XR,XI)
*
      Y = A02ABF(XR,XI)
      WRITE (NOUT,*) '      XR      XI      Y'
      WRITE (NOUT,99999) XR, XI, Y
*
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
