NAG Fortran Library Routine Document

X02AJF

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

X02AJF returns the **machine precision**, i.e., $\frac{1}{2} \times b^{1-p}$ if ROUNDS is .TRUE. (see Section 2.1.1 in the X02 Chapter Introduction for a description of ROUNDS) or b^{1-p} otherwise, where b is the base and p is the precision (i.e., the number of significant base-b digits).

2 Specification

> **double precision** FUNCTION X02AJF ()

3 Description

None.

4 References

None.

5 Parameters

None.

6 Error Indicators and Warnings

None.

7 Accuracy

None.

8 Further Comments

None.

9 Example

This example prints the values of all the functions in Chapter X02. The results will vary from one implementation of the Library to another.

9.1 Program Text

```
*     X02AJF Example Program Text
*     Mark 17 Revised. NAG Copyright 1995.
*     .. Parameters ..
      INTEGER          NOUT
      PARAMETER        (NOUT=6)
*     .. External Functions ..
      DOUBLE PRECISION X02AHF, X02AJF, X02AKF, X02ALF, X02AMF, X02ANF
      INTEGER          X02BBF, X02BEF, X02BHF, X02BJF, X02BKF, X02BLF
      LOGICAL          X02DAF, X02DJF
```

```
      EXTERNAL          X02AHF, X02AJF, X02AKF, X02ALF, X02AMF, X02ANF,
     +                  X02BBF, X02BEF, X02BHF, X02BJF, X02BKF, X02BLF,
     +                  X02DAF, X02DJF
*     .. Executable Statements ..
      WRITE (NOUT,*) 'X02AJF Example Program Results'
      WRITE (NOUT,*)
      WRITE (NOUT,*) '(results are machine-dependent)'
      WRITE (NOUT,*)
      WRITE (NOUT,*) 'The basic parameters of the model'
      WRITE (NOUT,*)
      WRITE (NOUT,99999) ' X02BHF = ', X02BHF(),
     + '  (the model parameter B)'
      WRITE (NOUT,99999) ' X02BJF = ', X02BJF(),
     + '  (the model parameter P)'
      WRITE (NOUT,99999) ' X02BKF = ', X02BKF(),
     + '  (the model parameter EMIN)'
      WRITE (NOUT,99999) ' X02BLF = ', X02BLF(),
     + '  (the model parameter EMAX)'
      WRITE (NOUT,99998) ' X02DJF = ', X02DJF(),
     + '  (the model parameter ROUNDS)'
      WRITE (NOUT,*)
      WRITE (NOUT,*) 'Derived parameters of floating-point arithmetic'
      WRITE (NOUT,*)
      WRITE (NOUT,99997) ' X02AJF = ', X02AJF(),
     + '  (the machine precision)'
      WRITE (NOUT,99997) ' X02AKF = ', X02AKF(),
     + '  (the smallest positive model number)'
      WRITE (NOUT,99997) ' X02ALF = ', X02ALF(),
     + '  (the largest positive model number)'
      WRITE (NOUT,99997) ' X02AMF = ', X02AMF(),
     + '  (the real safe range parameter)'
      WRITE (NOUT,99997) ' X02ANF = ', X02ANF(),
     + '  (the complex safe range parameter)'
      WRITE (NOUT,*)
      WRITE (NOUT,*)
     + 'Parameters of other aspects of the computing environment'
      WRITE (NOUT,*)
      WRITE (NOUT,99994) ' X02AHF = ', X02AHF(0.0D0),
     + '  (largest argument for SIN and COS)'
      WRITE (NOUT,99996) ' X02BBF = ', X02BBF(0.0D0),
     + '  (largest positive integer)'
      WRITE (NOUT,99996) ' X02BEF = ', X02BEF(0.0D0),
     + '  (precision in decimal digits)'
      WRITE (NOUT,99995) ' X02DAF = ', X02DAF(0.0D0),
     + '  (indicates how underflow is handled)'
      STOP
*
99999 FORMAT (1X,A,I7,A)
99998 FORMAT (1X,A,L7,A)
99997 FORMAT (1X,A,1P,E26.18,1X,A)
99996 FORMAT (1X,A,I20,A)
99995 FORMAT (1X,A,L20,A)
99994 FORMAT (1X,A,1P,E19.8,1X,A)
      END
```

9.2   Program Data

None.

9.3   Program Results

```
 X02AJF Example Program Results

 (results are machine-dependent)

 The basic parameters of the model

  X02BHF =        2  (the model parameter B)
  X02BJF =       53  (the model parameter P)
  X02BKF =    -1021  (the model parameter EMIN)
```

```
 X02BLF =     1024  (the model parameter EMAX)
 X02DJF =        T  (the model parameter ROUNDS)

Derived parameters of floating-point arithmetic

 X02AJF =   1.110223024625156787E-16   (the machine precision)
 X02AKF =   2.225073858507201383-308   (the smallest positive model number)
 X02ALF =   1.797693134862315708+308   (the largest positive model number)
 X02AMF =   2.225073858507201383-308   (the real safe range parameter)
 X02ANF =   2.225073858507201383-308   (the complex safe range parameter)

Parameters of other aspects of the computing environment

 X02AHF =      1.42724769E+45   (largest argument for SIN and COS)
 X02BBF =          2147483647   (largest positive integer)
 X02BEF =                  15   (precision in decimal digits)
 X02DAF =                   F   (indicates how underflow is handled)
```