1 SUMMARY

Given $x \geq 0$ computes the values of the **Spherical Bessel functions**

$$j_n(x) = \left(\frac{\pi}{2x}\right)^{\frac{1}{2}} J_{n+\frac{1}{2}}(x)$$

for $n = 0$ up to N, $N \leq 29$.

The method used is based upon the recurrence relation

$$j_{n+1}(x) = \left(\frac{2n+1}{x}\right) j_n(x) - j_{n-1}(x)$$

given by F.J. Corbalo and J.L. Uretsky, J.A.C.M., Vol. 6, No. 3.

ATTRIBUTES — Version: 1.0.0. **Types:** `FF05A; FF05AD.` **Original date:** December 1963. **Origin:** F.R.Hopgood*, Harwell.

2 HOW TO USE THE PACKAGE

The single precision version

```
CALL FF05A(N,X,ARRAY)
```

The double precision version

```
CALL FF05AD(N,X,ARRAY)
```

`N` is an `INTEGER` variable which must be set by the user to the upper limit of the range of functions to be computed, i.e. the subroutine will return the values of $j_n(x)$, n=0,1,..,N. **Restriction:** $1 \leq N \leq 29$.

`X` is a `REAL` (`DOUBLE PRECISION` in the D version) variable which must be set by the user to the value of the argument x. **Restriction:** $x \geq 0$.

`ARRAY` is a `REAL` (`DOUBLE PRECISION` in the D version) array of length at least `N+1` which is set by the subroutine to the function values. The computed values of $j_n(x)$, n=0,1,..,N will be stored in `ARRAY(I) I=1,N+1.`

3 GENERAL INFORMATION

Use of common: none.

Workspace: none.

Other subroutines: none.

Input/Output: prints a diagnostic message when any of the restrictions are violated.

Restrictions:

$x \geq 0$,

$1 \leq N \leq 29$.

Accuracies: The 8-byte version has been checked and found to give at least ten decimal digits accuracy in the range $0 \leq x \leq 20$. There is no reason why it should not give at least 13 figure accuracy over the whole range of positive x values. The 4-byte version is accurate to 6 figures.

4 METHOD

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