1 SUMMARY

To **interpolate the value of an even function** $f(x)$, i.e. such that $f(-x)=f(x)$, given n function values f_i at points x_i, i=1, 2,..., n not necessarily equally spaced.

A polynomial $P(x)$ of degree $2(n-1)$ is constructed such that $P(x_i)=f_i$ and $P(-x_i)=f_i$ i=1,n and based on the Lagrange interpolation formula. The coefficients of $P(x)$ are not computed.

ATTRIBUTES — Version: 1.0.0. **Types:** `TB01A; TB01AD`. **Original date:** March 1963. **Origin:** A.G.Hearn, Harwell.

2 HOW TO USE THE PACKAGE

2.1 Argument list and calling sequence

The single precision version

```
CALL TB01A(X,F,XVAL,FVAL,N)
```

The double precision version

```
CALL TB01AD(X,F,XVAL,FVAL,N)
```

`X` is a `REAL` (`DOUBLE PRECISION` in the D version) array of length at least n which the user must set to contain the values of the points x_i, i=1, 2,..., n. It is not altered by the subroutine. **Restriction:** the moduli of the points must be distinct, i.e. $|x_i| \neq |x_j|$ for all $i \neq j$.

`F` is a `REAL` (`DOUBLE PRECISION` in the D version) array of length at least n which the user must set to contain the function values f_i at the points x_i, i=1, 2,..., n. The subroutine will assume that $f(-x_i)=f(x_i)$. `F` is not altered by the subroutine.

`XVAL` is a `REAL` (`DOUBLE PRECISION` in the D version) variable which the user must set to the value of x for which the interpolated value of $f(x)$ is required. `XVAL` is not altered by the subroutine.

`FVAL` is a `REAL` (`DOUBLE PRECISION` in the D version) variable which is set by the subroutine to the interpolated value of $f(x)$ at the point given in `XVAL.` It need not be set by the user.

`N` is an `INTEGER` variable which must be set by the user to n, the number of function values passed in the array `F.` It is not altered by the subroutine.

3 GENERAL INFORMATION

Use of common: none.

Workspace: none.

Other routines called directly: none.

Input/output: none.

Restrictions: $|x_i| \neq |x_j|$ for all $i \neq j$.

4 METHOD

The interpolation is based on the $2(n-1)$th degree even polynomial $P(x)$ which is equal to f_i at the $2n$ points $-x_i$ and x_i, $i=1, 2, ..., n$. A Lagrange interpolation formula is used and the number of operations per call is of order n^2. If many interpolations are required it will be more efficient to use another library subroutine to derive $P(x)$ explicitly since each interpolation value will then cost only of order n operations.