1 SUMMARY

Calculates the coefficients of the **piece-wise cubic** function which **interpolates** n **given function values** f_i at points x_i, i=1, 2,..., n.

The interpolation function derived will be continuous and have continuous first derivatives. If the function values lie on a quadratic polynomial, this will be represented exactly. The subroutine returns the coefficients of the n–1 cubics $C_i(\theta)$ corresponding to the n–1 intervals x_i to x_{i+1} in the transformed variables

$$\theta = \frac{x - x_i}{x_{i+1} - x_i}, \qquad \text{i.e.} \qquad C_i(\theta) = a_1 + a_2\theta + a_3\theta^2 + a_4\theta^3 \qquad 0 \le \theta \le 1$$

ATTRIBUTES — Version: 1.0.0. **Types:** `TB03A`; `TB03AD`. **Original date:** July 1964. **Origin:** D.Miller, Harwell.

2 HOW TO USE THE PACKAGE

2.1 Argument list

The single precision version

```
CALL TB03A(N,F,X,A)
```

The double precision version

```
CALL TB03AD(N,F,X,A)
```

`N` is an `INTEGER` variable which must be set by the user to n, the number of function values passed in the array `F`. `N` is not altered by the subroutine. **Restriction:** $n \ge 4$.

`F` is a `REAL` (`DOUBLE PRECISION` in the D version) array which must be set by the user to contain the function values f_i, i=1, 2,..., n. `F` is not altered by the subroutine.

`X` is a `REAL` (`DOUBLE PRECISION` in the D version) array which must be set by the user to contain the values of the points x_i, i=1, 2,..., n. `X` is not altered by the subroutine. **Restriction:** the points must be ordered and distinct, i.e. $x_1 < x_2 < ... < x_n$.

`A` is a two-dimensional `REAL` (`DOUBLE PRECISION` in the D version) array of first dimension 4 and second dimension at least n–1, which is set by the subroutine to the coefficients of the cubics for the n–1 intervals. In the interval x_i to x_{i+1} the function is represented by the cubic

$$C_i(\theta) = a_{1,i} + a_{2,i}\theta + a_{3,i}\theta^2 + a_{4,i}\theta^3$$

which is a good approximation to $f\{(1-\theta)x_i + \theta x_{i+1}\}$. The values of $a_{j,i}$, j=1, 2, 3, 4 and i=1, 2,..., n–1 are returned in `A(J,I), J=1,4` and `I=1,N-1.`

Note that the values of f_i and f_{i+1} are given by substituting θ=0 and θ=1 respectively, and values for x between x_i and x_{i+1} are given by values of θ between 0 and 1.

3 GENERAL INFORMATION

Use of common: None.

Workspace: None.

Other routines called directly: None.

Input/output: None.

Restrictions: None.