1 SUMMARY

Given function values $f_1, f_2, .., f_n$ at points $x_1 < x_2 < ... < x_n$, not necessarily equally spaced, **finds a cubic spline** $S(x)$ **that interpolates the** n **function values,** i.e. $S(x_i) = f_i$, i=1, 2,..., n, where $S(x)$ has knots at the points x_i, i=1, 2,..., n.

The 3rd derivative at the points x_2 and x_{n-1} is continuous.

The spline is defined on return by the knots x_i, its values f_i at the knots and its first derivative values at the knots.

ATTRIBUTES — Version: 1.0.0. **Remark:** TG01 or TG02 can be used to evaluate the computed spline. **Types:** TB04A; TB04AD. **Original date:** February 1970. **Origin:** J.K.Reid, Harwell.

2 HOW TO USE THE PACKAGE

The single precision version

        CALL TB04A(N,X,F,D,W)

The double precision version

        CALL TB04AD(N,X,F,D,W)

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

X   is a REAL (DOUBLE PRECISION in the D version) array of length at least n which must be set by the user to contain the points x_i i=1, 2,..., n (note these are also the knots). X is not altered by the subroutine. **Restriction:** These must be ordered and distinct such that $x_1 < x_2 < ... < x_n$; if this condition is not fulfilled W(1) is set to one and a diagnostic message is printed by the subroutine.

F   is a REAL (DOUBLE PRECISION in the D version) array of length at least n 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.

D   is a REAL (DOUBLE PRECISION in the D version) array of length at least n in which the subroutine returns the values of the first derivative of the spline $S(x)$ at the knots x_i, i=1, 2,..., n.

W   is a REAL (DOUBLE PRECISION in the D version) array of length at least $3n$ which is used by the subroutine as workspace. W(1) is used as an error flag and is set to zero on a successful return and to one on a failure.

3 GENERAL INFORMATION

Use of common: None.

Workspace: User supplies $3n$ words in argument W.

Other routines called directly: None.

Input/output: A diagnostic is printed when errors occur.

Restrictions: $n \geq 4$, the x_i must be ordered and distinct.