1 SUMMARY

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

The 3rd derivative at the points $x_i$ and $x_{i+1}$ 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 $x_i$, $i = 1, 2, \ldots, n$ (note these are also the knots). $X$ is not altered by the subroutine. Restriction: These must be ordered and distinct such that $x_1 < x_2 < \ldots < x_n$; 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 $f_i$, $i = 1, 2, \ldots, n$. $F$ 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 $x_i$, $i = 1, 2, \ldots, n$.

$W$ 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.