spline3() — Cubic spline interpolation

**Description**

`spline3(x, y)` returns the coefficients of a cubic natural spline \( S(x) \). The elements of \( x \) must be strictly monotone increasing.

`spline3eval(spline_info, x)` uses the information returned by `spline3()` to evaluate and return the spline at the abscissas \( x \). Elements of the returned result are set to missing if outside the range of the spline. \( x \) is assumed to be monotonically increasing.

**Syntax**

\[
\text{real matrix } \quad \text{spline3(real vector } x, \text{ real vector } y) \\
\text{real vector } \quad \text{spline3eval(real matrix } \text{spline info, real vector } x)
\]

**Remarks and examples**

`spline3()` and `spline3eval()` is a translation into Mata of Herriot and Reinsch (CUBNATSPLINE) (1973).

For \( xx \) in \([x_i, x_{i+1})\):

\[
S(xx) = \{(d_i t + c_i) t + b_i\} t + y_i
\]

with \( t = xx - x_i \).

`spline3()` returns \((b, c, d, x, y)\) or, if \( x \) and \( y \) are row vectors, \((b, c, d, x', y')\).

**Conformability**

\[
\begin{align*}
\text{spline3}(x, y): & \\
\text{x:} & \quad n \times 1 \quad \text{or} \quad 1 \times n \\
\text{y:} & \quad n \times 1 \quad \text{or} \quad 1 \times n \\
\text{result:} & \quad n \times 5 \\
\text{spline3eval(spline info, x):} & \\
\text{spline_info:} & \quad n \times 5 \\
\text{x:} & \quad m \times 1 \quad \text{or} \quad 1 \times m \\
\text{result:} & \quad m \times 1 \quad \text{or} \quad 1 \times m
\end{align*}
\]
Diagnostics

`spline3(x, y)` requires that `x` be in ascending order.

`spline3eval(spline_info, x)` requires that `x` be in ascending order.

Reference


Also see

[M-4] mathematical — Important mathematical functions