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

\[
\begin{align*}
\text{real matrix} & \quad \text{spline3} & \text{(real vector } x, \text{ real vector } y) \\
\text{real vector} & \quad \text{spline3eval} & \text{(real matrix } \text{spline_info}, \text{ real vector } x)
\end{align*}
\]

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

spline3(x, y):

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

\[
\begin{align*}
\text{spline_info}: & \quad n \times 5 \\
x: & \quad m \times 1 \text{ or } 1 \times m \\
\text{result}: & \quad m \times 1 \text{ or } 1 \times m
\end{align*}
\]
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