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

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

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