**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

- `real matrix spline3(real vector x, real vector y)`
- `real vector spline3eval(real matrix 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

**spline3(x, y):**

- $x$: $n \times 1$ or $1 \times n$
- $y$: $n \times 1$ or $1 \times n$
- *result*: $n \times 5$

**spline3eval(spline_info, x):**

- `spline_info`: $n \times 5$
- $x$: $m \times 1$ or $1 \times m$
- *result*: $m \times 1$ or $1 \times m$
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