Title

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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

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

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

$$\mathrm{S}(xx) = \{(d_i t + c_i)t + b_i\}t + y_i$$

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

Herriot, J. G., and C. H. Reinsch. 1973. Algorithm 472: Procedures for natural spline interpolation [E1]. *Communications of the ACM* 16: 763–768.

Also see

[M-4] **mathematical** — Important mathematical functions