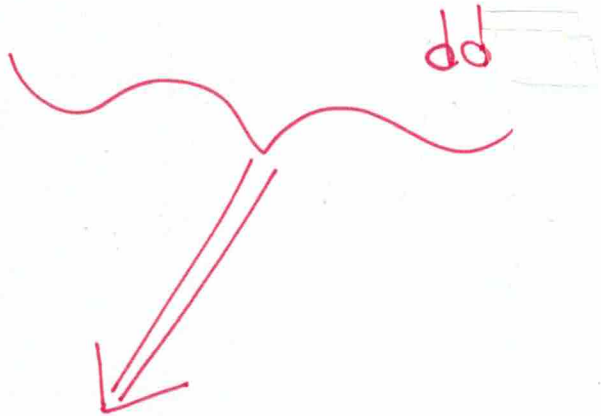


Variable strutturate

$[x, Cmat, l, K] = unmk_{pp}(s3)$



↓
output di
spline (x,y)

breaks : x

coefs : Cmat

pieces : l

order : K

dim : dd

$x = s3.breaks$

$Cmat = s3.coefs$

$l = s3.pieces$

$K = s3.order$

$dd = s3.dim$

INTEGRALE DEFINITO DI UNA SPLINE CUBICA

$$S_3(x) \Big|_{[x_j, x_{j+1}]} = \overbrace{C_{j1}(x-x_j)^3 + C_{j2}(x-x_j)^2 + C_{j3}(x-x_j) + C_{j4}}^{s_j(x)}$$

$$\begin{array}{cc} x_j & x_{j+1} \\ | & | \\ \hline \end{array}$$

h (nodi equispaziati)

$$h = x_{j+1} - x_j \quad \forall j$$

$$\int_{x_j}^{x_{j+1}} s_j(x) dx = I_j$$

$$C_{j1}(x-x_j)^3 + C_{j2}(x-x_j)^2 + C_{j3}(x-x_j) + C_{j4}$$

1° modo :

$$\begin{array}{ll} t = x - x_j & x = x_j \quad t = 0 \\ dt = dx & x = x_{j+1} \quad t = x_{j+1} - x_j \end{array}$$

$$p = \text{polyint}(C_j) \quad \int_0^{(x_{j+1}-x_j)} (C_{j1}t^3 + C_{j2}t^2 + C_{j3}t + C_{j4}) dt$$

$$\text{polyval}(p, x(j+1) - x(j)) - \text{polyval}(p, 0) \Rightarrow I_j$$

inte_spline3_a.m

2° modo

$$I_j = \int_{x_j}^{x_{j+1}} (c_{j1}(x-x_j)^3 + c_{j2}(x-x_j)^2 + c_{j3}(x-x_j) + c_{j4}) dx$$

$$= \left[c_{j1} \frac{(x-x_j)^4}{4} + c_{j2} \frac{(x-x_j)^3}{3} + c_{j3} \frac{(x-x_j)^2}{2} + c_{j4} (x-x_j) \right]_{x_j}^{x_{j+1}}$$

$$= \frac{h^4}{4} \cdot c_{j1} + \frac{h^3}{3} c_{j2} + \frac{h^2}{2} c_{j3} + h c_{j4}$$

inte_spline3_b.m

x_m

$$\int_{x_0} s_3(x) dx = I_1 + I_2 + \dots + I_n$$

x_0