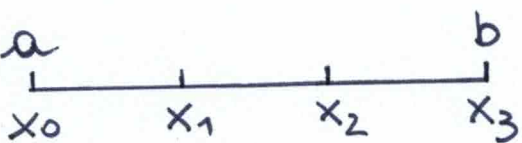


DERIVATA DI UNA SPLINE CUBICA PRIMITIVA

$$S_3: \mathbb{R} \rightarrow \mathbb{R} \quad \{x_0, x_1, \dots, x_n\}$$
$$\in C^2[a, b] \quad \begin{array}{c} \parallel \\ a \end{array} \quad \begin{array}{c} \parallel \\ b \end{array}$$

$$S'_3 \in C^1[a, b], \quad S'_3|_{[x_j, x_{j+1}]} \in \mathbb{P}_2$$

$$S''_3 \in C^0[a, b], \quad S''_3|_{[x_j, x_{j+1}]} \in \mathbb{P}_1$$

Es: 

$$\begin{bmatrix} C_{11} & C_{12} & C_{13} & C_{14} \\ C_{21} & C_{22} & C_{23} & C_{24} \\ C_{31} & C_{32} & C_{33} & C_{34} \end{bmatrix}$$

matrice C3

$$S_3(x) = \begin{cases} C_{11}(x-x_0)^3 + C_{12}(x-x_0)^2 + C_{13}(x-x_0) + C_{14} & [x_0, x_1) \\ C_{21}(x-x_1)^3 + C_{22}(x-x_1)^2 + C_{23}(x-x_1) + C_{24} & [x_1, x_2) \\ C_{31}(x-x_2)^3 + C_{32}(x-x_2)^2 + C_{33}(x-x_2) + C_{34} & [x_2, x_3) \end{cases}$$

CALCOLO DELLA DERIVATA PRIMA di S_3 : S_2
spline quadratica, C^1

$$S_2(x) = \begin{cases} 3C_{11}(x-x_0)^2 + 2C_{12}(x-x_0) + C_{13} & [x_0, x_1) \\ 3C_{21}(x-x_1)^2 + 2C_{22}(x-x_1) + C_{23} & [x_1, x_2) \\ 3C_{31}(x-x_2)^2 + 2C_{32}(x-x_2) + C_{33} & [x_2, x_3] \end{cases}$$

Matrice dei coefficienti

$$\begin{bmatrix} 3C_{11} & 2C_{12} & C_{13} \\ 3C_{21} & 2C_{22} & C_{23} \\ 3C_{31} & 2C_{32} & C_{33} \end{bmatrix} \quad \text{matrice } C2$$

for $i = \text{indice di riga}$

$C2(i, :) = \text{polyder}(C3(i, :));$

end

CALCOLO DELLA DERIVATA
spline lineare, C^0

$$S_1(x) = \begin{cases} 6C_{11}(x-x_0) + 2C_{12} \\ 6C_{21}(x-x_1) + 2C_{22} \\ 6C_{31}(x-x_2) + 2C_{32} \end{cases}$$

SECONDA di $S_3 : S_1$

$[x_0, x_1)$

$[x_1, x_2)$

$[x_2, x_3]$

Matrice dei coefficienti

$$\begin{bmatrix} 6C_{11} & 2C_{12} \\ 6C_{21} & 2C_{22} \\ 6C_{31} & 2C_{32} \end{bmatrix}$$

matrice $C1$

for $i = \text{indice di riga}$

$C1(i, :) = \text{polyder}(C2(i, :));$

end