

Data

x 10 25 40 55

y 12 26 28 30

$k_1 = k_4 = 0$ unknowns k_2, k_3

$i = 2:n-1$, $n=4$

$i=2$

$$\cancel{k_1}(x_1 - x_2) + 2k_2(x_1 - x_3) + k_3(x_2 - x_3) = 0$$
$$= 6 \cdot \left[\frac{y_1 - y_2}{x_1 - x_2} - \frac{y_2 - y_3}{x_2 - x_3} \right]$$

$i=3$

$$k_2(x_2 - x_3) + 2k_3(x_2 - x_4) + k_4(x_3 - x_4) =$$
$$= 6 \cdot \left[\frac{y_2 - y_3}{x_2 - x_3} - \frac{y_3 - y_4}{x_3 - x_4} \right]$$

Matrix form

$$\begin{bmatrix} 2(x_1 - x_3) & (x_2 - x_3) \\ (x_2 - x_3) & 2(x_2 - x_4) \end{bmatrix} \begin{bmatrix} k_2 \\ k_3 \end{bmatrix} =$$

$$= 6 \begin{bmatrix} \frac{y_1 - y_2}{x_1 - x_2} - \frac{y_2 - y_3}{x_2 - x_3} \\ \frac{y_2 - y_3}{x_2 - x_3} - \frac{y_3 - y_4}{x_3 - x_4} \end{bmatrix}$$

functions

$$\boxed{i=1} \quad f_{1,2}(x) = \cancel{\frac{k_1}{6}} \left(\begin{matrix} \nearrow 0 \\ \end{matrix} \right) - \frac{k_2}{6} \cdot \left[\frac{(x - x_1)^3}{x_1 - x_2} - (x - x_1)(x_1 - x_2) \right] + \frac{y_1(x - x_2) + y_2(x - x_1)}{x_1 - x_2}$$

$$\boxed{l=2} \quad f_{2,3}(x) = \frac{k_2}{6} \left[\frac{(x-x_3)^3}{(x_2-x_3)} - (x-x_3)(x_2-x_3) \right]$$

$$- \frac{k_3}{6} \left[\frac{(x-x_2)^3}{(x_2-x_3)} - (x-x_2)(x_2-x_3) \right]$$

$$+ \frac{y_2(x-x_3) - y_3(x-x_2)}{x_2-x_3}$$

$$\boxed{l=3} \quad f_{3,4}(x) = \frac{k_3}{6} \left[\frac{(x-x_4)^3}{(x_3-x_4)} - (x-x_4)(x_3-x_4) \right]$$

$$- \frac{k_4}{6} \left[\frac{(x-x_3)^3}{x_3-x_4} - (x-x_3)(x_3-x_4) \right]$$

$$+ \frac{y_3(x-x_4) - y_4(x-x_3)}{x_3-x_4}$$