

Der Neville - Algorithmus zur Berechnung von $p(x)$:

- Sei $P_{i_0, i_1, \dots, i_K}(x) \in P_K$ das Interpolationspolynom vom Grade $\leq K$ mit $P_{i_0, i_1, \dots, i_K}(x_{i_j}) = f_{i_j}$, $j=0, 1, \dots, K$

Satz 7.2:

$$p_i(x) = f_i, \quad i = \overline{0, n}$$

$$P_{i_0, i_1, \dots, i_K}(x) = \frac{(x - x_{i_0}) P_{i_1, \dots, i_K}(x) - (x - x_{i_K}) P_{i_0, i_1, \dots, i_{K-1}}(x)}{x_{i_K} - x_{i_0}}$$

Beweis: induktiv

$$P_{i_0, i_1, \dots, i_K}(x_{i_0}) = P_{i_1, i_2, \dots, i_K}(x_{i_0}) = f_{i_0}$$

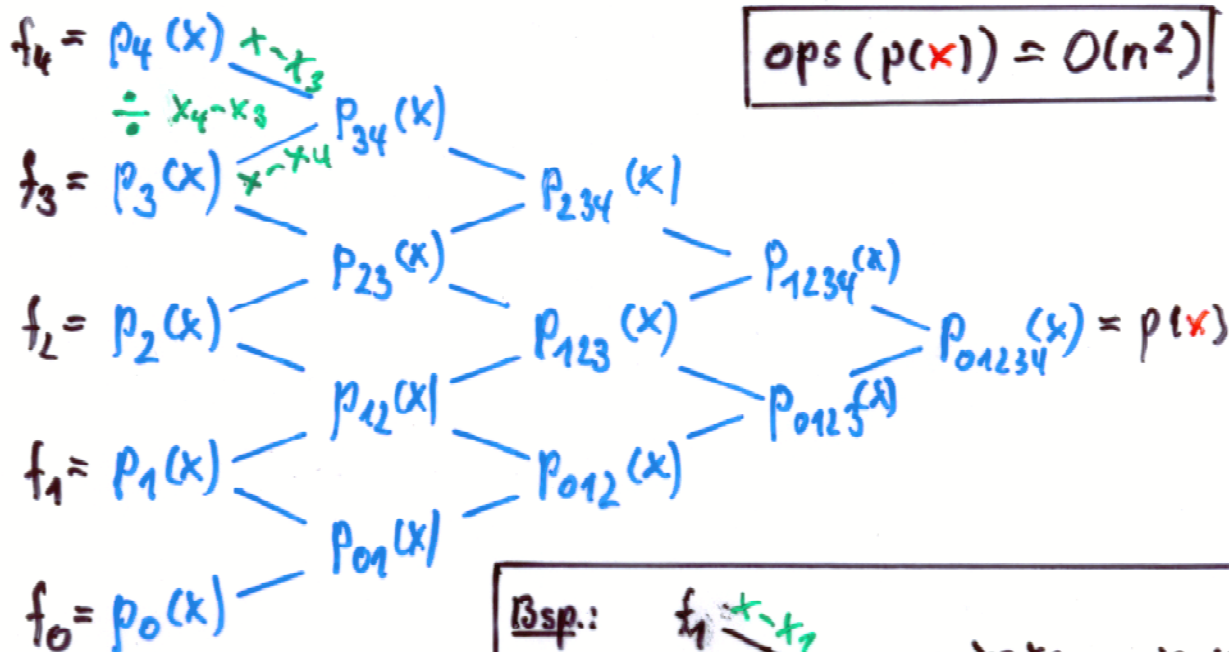
$$P_{i_0, i_1, \dots, i_K}(x_{i_K}) = P_{i_1, i_2, \dots, i_K}(x_{i_K}) = f_{i_K}$$

Für $j = 1, 2, \dots, K-1$ gilt:

$$P_{i_0, i_1, \dots, i_K}(x_{i_j}) = \frac{(x_{i_j} - x_{i_0}) P_{i_1, \dots, i_K}(x_{i_j}) - (x_{i_j} - x_{i_K}) P_{i_0, i_1, \dots, i_{K-1}}(x_{i_j})}{x_{i_K} - x_{i_0}}$$

$$= \frac{(x_{i_j} - x_{i_0}) f_{i_j} - (x_{i_0} - x_{i_K}) f_{i_j}}{x_{i_K} - x_{i_0}} = f_{i_j} \quad \text{q.e.d.}$$

- Neville - Algorithmus: $p(x) = P_{0, 1, \dots, n}(x)$, z.B. $n=4$



$$\text{ops}(p(x)) = O(n^2)$$

Bsp.: $n=1$

$$p(x) = f_1 \frac{x - x_0}{x_1 - x_0} + f_0 \frac{x - x_1}{x_1 - x_0}$$