

# LAGRANGEOV POLYNÓM

UZLOVÉ BODY:  $x_0, x_1, x_2$

ODPOVEDAJÚCE FUNKČNÉ HODNOTY:  $y_0, y_1, y_2$

STUPEŇ POLYNÓMU:  $m=2$

INTERPOLAČNÍ POLYNÓM:  $p(x) = \sum_{i=0}^m \left( y_i \prod_{\substack{j=0 \\ j \neq i}}^m \frac{x-x_j}{x_i-x_j} \right)$

$i$	0	1	2
$x_i$	1	2	-4
$y_i$	3	-5	4

ÚLOHA:  
HĀDÁM  $p(x)$  pre  $x = -1$ .

$$l_0(x) = \prod_{\substack{j=0 \\ j \neq 0}}^2 \frac{x-x_j}{x_0-x_j} = \prod_{\substack{j=1 \\ j \neq 0}}^2 \frac{x-x_j}{x_0-x_j} = \frac{x-x_1}{x_0-x_1} \cdot \frac{x-x_2}{x_0-x_2} = \frac{1}{1-1} \cdot \frac{1}{5} (x-2)(x-(-4)) =$$

$$= -\frac{1}{5} (x^2 + 4x - 2x - 8) = -\frac{1}{5} (x^2 + 2x - 8)$$

$$l_1(x) = \prod_{\substack{j=0 \\ j \neq 1}}^2 \frac{x-x_j}{x_1-x_j} = \frac{x-x_0}{x_1-x_0} \cdot \frac{x-x_2}{x_1-x_2} = \frac{x-1}{2-1} \cdot \frac{x-(-4)}{2-(-4)} =$$

$$= \frac{x^2 - x + 4x - 4}{1 \cdot 6} = \frac{1}{6} (x^2 + 3x - 4)$$

$$l_2(x) = \frac{x-x_0}{x_2-x_0} \cdot \frac{x-x_1}{x_2-x_1} = \frac{x-1}{-4-1} \cdot \frac{x-2}{-4-2} = \frac{x^2 - x - 2x + 2}{(1-5)(-6)} = \frac{1}{30} (x^2 - 3x + 2)$$

$$p(x) = y_0 \cdot l_0(x) + y_1 \cdot l_1(x) + l_2(x) \cdot y_2$$

$$p(x) = 3 \cdot \left(-\frac{1}{5}\right) \cdot (x^2 + 2x - 8) + (-5) \cdot \frac{1}{6} (x^2 + 3x - 4) + \frac{4}{30} (x^2 - 3x + 2) =$$

$$= -\frac{3}{5} x^2 - \frac{5}{6} x^2 + \frac{4}{30} x^2 - \frac{6}{5} x - \frac{5}{2} x - \frac{4}{10} x + \frac{24}{5} + \frac{20}{6} + \frac{8}{30} =$$

$$= -1,3x^2 - 4,1x + 8,4$$

PRE  $x = -1$ :  $p(-1) = 11,2$