4

$$l_k(x) = \prod_{\substack{i=0 \\ i \neq k}}^{n} \frac{x - x_i}{x_k - x_i}$$

x	-2	-1	0	1	2	3
$P(x)$	-5	1	1	1	7	25

BY THE UNIQUENESS THEOREM FROM LECTURE NOTES 21 (...$P(x) = Q(x)$...),

$$l_k(x) = \prod_{\substack{i=0 \\ i \neq k}}^{n} \frac{x - x_i}{x_k - x_i} = p(x) \quad \text{FOR SOME } n \leq 5,$$

$$X = \{x_0 = -2,\ x_1 = -1,\ x_2 = 0,\ x_3 = 1,\ x_4 = 2,\ x_5 = 3\}$$

$$P(x) = \{-5, 1, 1, 1, 7, 25\}$$

OTHERWISE $P(x)$ DOES NOT HAVE DEGREE n

$\longrightarrow n = 5$

$$l_k(x) = \not\varnothing \neq P(x) \longrightarrow 1 \leq n \leq 5$$

$n = 1$

$$l_0(x) = \frac{x - x_1}{x_0 - x_1} = \frac{x + 1}{-2 + 1} = -x - 1$$