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$$f_0(x) = -x - 1$$

$$f_0(x_0) = 2 - 1 = 1 \neq p(x_0)$$

$$f_1(x) = \cancel{x} \neq p(x)$$

$n = 2$

$$f_0(x) = \frac{x - x_1}{x_0 - x_1} \cdot \frac{x - x_2}{x_0 - x_2} = \frac{x + 1}{-2 + 1} \cdot \frac{x - 2}{-2 - 2} = -\frac{1}{2}x(x + 1) = -\frac{1}{2}x^2 - x$$

$$f_0(x_0) = -\frac{1}{2}(-2)^2 - 2 = -2 \neq p(x_0)$$

$$f_1(x) = \frac{x - x_2}{x_1 - x_2} \cdot \frac{x - x_0}{x_1 - x_0} = \frac{x + 2}{-1 + 2} \cdot \frac{x - 2}{-1 - 2} = -x(x + 2) = -x^2 - 2x$$

$$f_1(x_0) = -(-2)^2 - 2(-2) = -8 \neq p(x_0)$$

$$f_2(x) = \frac{x - x_0}{x_2 - x_0} \cdot \frac{x - x_1}{x_2 - x_1} = \frac{x + 2}{0 + 2} \cdot \frac{x + 1}{0 + 1} = \frac{1}{2}(x + 2)(x + 1)$$

$$= \frac{1}{2}(x^2 + 3x + 2)$$