Parcial 1

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a) $P_n(x) = \sum_{i=0}^{n} f(x_i)\, L_i(x)$

$L_i(x) = \prod \frac{x - x_j}{x_i - x_j}$

$$P(x) = f(x_0)\cdot\frac{x-x_1}{x_0-x_1}\cdot\frac{x-x_2}{x_0-x_2} + f(x_1)\cdot\frac{x-x_0}{x_1-x_0}\cdot\frac{x-x_2}{x_1-x_2} + f(x_2)\cdot\frac{x-x_0}{x_2-x_0}\cdot\frac{x-x_1}{x_2-x_1}$$

b) $$P(x) = \frac{f(x_0)}{(x_0-x_1)(x_0-x_2)}\cdot(x-x_1)(x-x_2) + \frac{f(x_1)}{(x_1-x_0)(x_1-x_2)}\cdot(x-x_0)(x-x_2)$$

$$+ \frac{f(x_2)}{(x_2-x_0)(x_2-x_1)}\cdot(x-x_0)(x-x_1)$$

$$P'(x) = \frac{f(x_0)}{(x_0-x_1)(x_0-x_2)}\cdot((x-x_2)+(x-x_1)) + \frac{f(x_1)}{(x_1-x_0)(x_1-x_2)}\cdot(x-x_2)+(x-x_0)$$

$$+ \frac{f(x_2)}{(x_2-x_0)(x_2-x_1)}\cdot(x-x_1)+(x-x_0)$$

$$P'(x_0) = \frac{f(x_0)}{2h^2}\cdot(-3h) + \frac{f(x_1)}{-h^2}\cdot(-2h) + \frac{f(x_2)}{2h^2}\cdot(-h)$$

$$P'(x_0) = \frac{-3f(x_0)}{2h} + \frac{2f(x_1)}{h} + \frac{-1f(x_2)}{2h}$$

$$P'(x_0) = \frac{1}{2h}\left(-3f(x_0) + 4f(x_1) - f(x_2)\right)$$

Tenemos que $x_1 = x_0 + h$

$x_2 = x_0 + 2x$, entonces

$$P'(x_0) = \frac{1}{2h}\left(-3f(x_0) + 4f(x_0+h) - f(x_0+2h)\right)$$