1) Conjunto soporte

$\Omega = \{ (x_0, f(x_0)), (x_1, f(x_1)), (x_2, f(x_2)) \}$

$$l_0 = \frac{x-x_1}{x_0-x_1} \cdot \frac{x-x_2}{x_0-x_2} = \frac{(x-x_1)(x-x_2)}{(x_0-x_1)(x_0-x_2)}$$

$$l_1 = \frac{x-x_0}{x_1-x_0} \cdot \frac{x-x_2}{x_1-x_2} = \frac{(x-x_0)(x-x_2)}{(x_1-x_0)(x_1-x_2)}$$

$$l_2 = \frac{x-x_0}{x_2-x_0} \cdot \frac{x-x_1}{x_2-x_1} = \frac{(x-x_0)(x-x_1)}{(x_2-x_0)(x_2-x_1)}$$

$$p'(x)_\Omega = f(x_0)\frac{(x-x_1)(x-x_2)}{(x_0-x_1)(x_0-x_2)} + f(x_1)\frac{(x-x_0)(x-x_2)}{(x_1-x_0)(x_1-x_2)} + f(x_2)\frac{(x-x_0)(x-x_1)}{(x_2-x_0)(x_2-x_1)}$$

2) $$p'(x_0) = \frac{f(x_0)}{(x_0-x_1)(x_0-x_2)}\left[x^2 - x_1x - x_2x + x_1x_2 \, dx\right] +$$

$$\frac{f(x_1)}{(x_1-x_0)(x_1-x_2)}\left[x^2 - x_0x - x_2x + x_0x_2 \, dx\right] +$$

$$\frac{f(x_2)}{(x_2-x_0)(x_2-x_1)}\left[x^2 - x_0x - x_1x + x_1x_0 \, dx\right]$$

$$= \frac{f(x_0)}{(x_0-x_1)(x_0-x_2)}\left[2x - x_1 - x_2\right] + \frac{f(x_1)}{(x_1-x_0)(x_1-x_2)}\left[2x - x_0 - x_2\right]$$

$$+ \frac{f(x_2)}{(x_2-x_0)(x_2-x_1)}\left[2x - x_0 - x_1\right]$$

$$= \frac{f(x_0)\,(2x_0 - x_1 - x_2)}{(x_0-x_1)(x_0-x_2)} + \frac{f(x_1)\,(x_0 - x_2)}{(x_1-x_0)(x_1-x_2)} + \frac{f(x_2)[x_0 - x_1]}{(\cancel{x_1}-x_0)(x_1-x_2)}$$

$$= \frac{-f(x_2)\left[\cancel{-x_0+x_1}\right]}{\cancel{(x_1-x_0)}\underbrace{(x_1-x_2)}_{h}} + \frac{f(\overbrace{x_1}^{h})\overbrace{(x_0-x_2)}^{2h}}{\underbrace{\underbrace{(x_1-x_0)}_{-h}\underbrace{(x_1-x_2)}_{h}}}\Bigg) + \frac{\overbrace{f(\overbrace{x_0}^{1/2h})\left(2\overbrace{x_0}^{1/2h}\overbrace{-x_1-x_2}^{h}\right)}^{-3f(x)}}{\underbrace{(x_0-x_1)}_{h}\underbrace{(x_0-x_2)}_{2h}}$$

$$= \frac{1}{2h}\left[-3f(x) + 4f(\overbrace{x+h}^{x_1 = h+x}) - f(\underbrace{x_2}_{2h+x})\right]$$