$$\mathcal{L}_0(x) = \frac{x - f(x_0)}{x_0 - f(x_0)} \qquad \mathcal{L}_2(x) = \frac{x - f(x_2)}{x_2 - f(x_2)}$$

$$\mathcal{L}_1(x) = \frac{x - f(x_1)}{x_1 - f(x_1)}$$

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

$$\overset{\shortparallel}{p(x)}$$

b. $p'(x_0) \approx f'(x_0)$

$$\frac{f(x_0)\,(1 - f'(x_0))}{x_0 - f(x_0)} \approx \frac{f(x_1) - f(x_{0-1})}{2h}$$

b)

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

$$\rightarrow f'(x_0) = \frac{f(x_0 + h) - f(x_0 - h)}{2h}$$

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

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

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