2) $f(x) = P_1(x) + \epsilon(x)$

El error $\epsilon(x)$ del Polinomio está dado Por:

$$\epsilon(x) = \frac{f''(\xi)}{2}(x-a)(x-b) \quad , \quad a \leq \xi \leq b$$

$$E = \int_a^b \epsilon(x)\,dx = \int_a^b \frac{f''(\xi)}{2}(x-a)(x-b)\,dx$$

$$E = \frac{f''(\xi)}{2}\int_a^b (x^2 - bx - ax + ab)\,dx$$

$$E = \frac{f''(\xi)}{2}\left(\frac{b^3}{3} - \frac{a^3}{3} - \frac{b^3}{2} + \frac{ba^2}{2} - \frac{ab^2}{2} + \frac{a^3}{2} + ab^2 - a^2b\right)$$

$$E = \frac{f''(\xi)}{2}\left(\frac{2b^3}{6} - \frac{2a^3}{6} - \frac{3b^3}{6} + \frac{3ba^2}{6} - \frac{3ab^2}{6} + \frac{3a^3}{2} + \frac{6ab^2}{6} - \frac{6a^2b}{6}\right)$$

$$E = \frac{f''(\xi)}{2}\left(\frac{-b^3 + a^3 - 3ba^2 + 3ab^2}{6}\right)$$

$$E = \frac{f''(\xi)}{2}\left(\frac{-(b-a)^3}{6}\right)$$

$$E = \frac{-f''(\xi)}{12}(b-a)^3$$

Reemplazando $h = b-a$

$$E = \frac{-h^3}{12} f''(\xi)$$