

Punto 4

$f(x) = p(x) + e(x)$, where p is a polynomial of degree ≤ 3

$$E = \int_a^b e(x) dx = \int_a^b \frac{f'''(\xi)}{4!} (x-a)(x-b) \left(x - \frac{a+b}{2}\right) dx = 0$$

$$\Rightarrow \frac{f'''(\xi)}{4!} \int_a^b (x-a)(x-b) \left(x - \frac{a+b}{2}\right) dx$$

$$\Rightarrow \frac{f'''(\xi)}{4!} \int_a^b x^3 + 3ax^2 - 3bx^2 + 4abx + b^2x + a^2x - a^2b - ab^2 dx$$

$$\Rightarrow \frac{f'''(\xi)}{4!} \left(\frac{x^4}{4} - \frac{ax^3}{2} - \frac{bx^3}{2} + abx + \frac{b^2x^2}{4} + \frac{a^2x^2}{4} - \frac{a^2b}{2} - \frac{ab^2}{2} \right) \Big|_a^b$$

\Rightarrow luego de reemplazar y cancelar términos

$$E = \frac{f'''(\xi)}{4} \left[\left(-\frac{1}{4} a^2 b^2 \right) - \left(-\frac{1}{4} a^2 b^2 \right) \right] = 0$$