Punto 9 - Integración

El error asociado a la regla de Simpson $\frac{3}{8}$ simple está dado por:

$$E = \frac{f^{(4)}(\xi)}{4!}\int_a^b (x-x_0)(x-x_1)(x-x_2)(x-x_3)\,dx = \frac{f^{(4)}(\xi)}{4!}\int_0^{3h} x(x-h)(x-2h)(x-3h)\,dx = \cdots$$

$$\cdots = \frac{f^{(4)}(\xi)}{4!}\int_0^{3h} (x^4 - 6x^3h + 11h^2x^2 - 6xh^3)\,dx = \cdots$$

$$\cdots = \frac{f^{(4)}(\xi)}{4!}\left[\frac{x^5}{5} - \frac{3}{2}x^4h + \frac{11}{3}x^3h^2 - 3x^2h^3\right]_{x=0}^{x=3h} = \cdots$$

$$\cdots = \frac{f^{(4)}(\xi)}{4!}\left(\frac{243h^5}{5} - \frac{243h^5}{2} + 99h^5 - 27h^5\right) = \cdots$$

$$\cdots = \frac{f^{(4)}(\xi)}{24}\left(-\frac{9}{10}h^5\right) = -\frac{3}{80}h^5 f^{(4)}(\xi)$$

$\blacksquare$