

PROBLEMA 7.3

$$x^4 - 5x^3 + x^2 - 3x + 4 : x_0 = 4$$

Basta escribir $x = x - 4 + 4$ y usar el binomio de Newton

$$\begin{aligned} x^4 - 5x^3 + x^2 - 3x + 4 &= (x-4+4)^4 \\ &\quad - 5(x-4+4)^3 \\ &\quad + (x-4+4)^2 \\ &\quad - 3(x-4+4) \\ &\quad + 4 \\ &= \sum_{k=0}^4 \binom{4}{k} 4^{4-k} (x-4)^k \\ &\quad - 5 \sum_{k=0}^3 \binom{3}{k} 4^{3-k} (x-4)^k \\ &\quad + 4^2 + 2 \cdot 4 \cdot (x-4) + (x-4)^2 \\ &\quad - 3(x-4) - 3 \cdot 4 \\ &\quad + 4 \\ &= (x-4)^4 + \\ &\quad + \left\{ \binom{4}{3} 4 - 5 \right\} (x-4)^3 \\ &\quad + \left\{ \binom{4}{2} 4^2 - 5 \binom{3}{2} 4 + 1 \right\} (x-4)^2 \\ &\quad + \left\{ \binom{4}{1} 4^3 - 5 \binom{3}{1} 4^2 + 2 \cdot 4 - 3 \right\} (x-4) \\ &\quad + 4^4 - 5 \cdot 4^3 + 4^2 - 3 \cdot 4 + 4 \\ &= (x-4)^4 + 11(x-4)^3 + 37(x-4)^2 \\ &\quad + 21(x-4) - 56 \end{aligned}$$