

① $f(x) = x^3 - 7x^2 + 8x + 16$

factors of 16 = -1, 1, 2, -2, 4, -4, -8, 8, 16, -16

roots factor
-1 (x+1)

4 (x-4)

$(x-4)(x+1) = x^2 - 3x - 4$

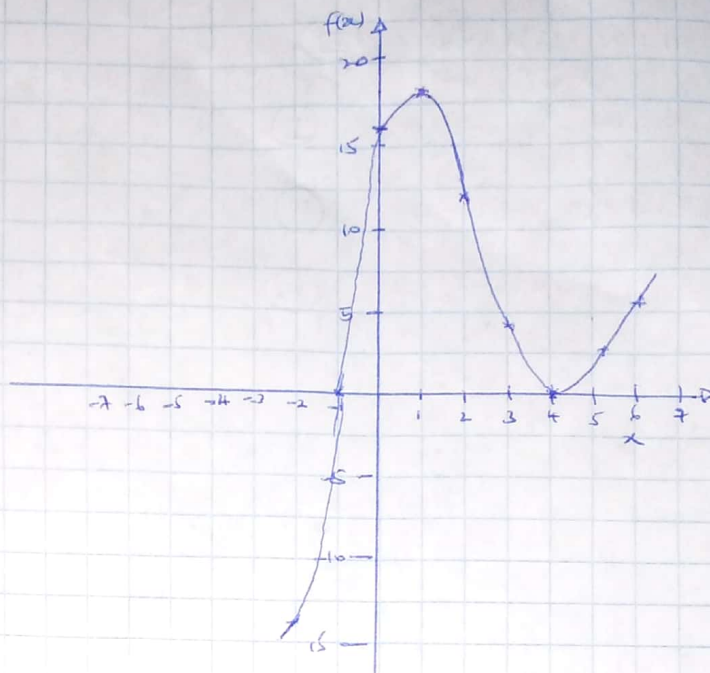
long division

$$\begin{array}{r} x-4 \\ x^2-3x+4 \overline{) x^3-7x^2+8x+16} \\ \underline{x^3-3x^2-4x} \\ -4x^2+12x+16 \\ \underline{-4x^2+12x+16} \\ 0 \end{array}$$

$f(x) = (x+1)(x-4)^2$

$f(x) = 0$

$x_1 = -1, x_2 = 4, x_3 = 4$



② $x^5 - 4x^3 + 7$

$$\begin{array}{r} x^4 + x^3 + 3x^2 + 3x + 3 \\ x+1 \overline{) x^5 - 4x^3 + 7} \\ \underline{x^5 + x^4} \\ -x^4 - 4x^3 \\ \underline{-x^4 + x^3} \\ -3x^3 + 7 \\ \underline{-3x^3 + 3x^2} \\ 3x^2 + 7 \\ \underline{3x^2 + 3x} \\ 3x + 7 \\ \underline{3x + 3} \\ -10 \end{array}$$

$f(x) = x^4 - x^3 - 3x^2 + 3x + 3 - \frac{10}{x+1}$

remainder = -10

③ $f(x) = (x+0)(x+2)(x-1)(x-3)$

$= x^4 - 2x^3 - 5x^2 + 6x$

④ $p(x) = x^3 - 7x^2 + kx - 10$

$x-1$ is a factor $x=1$

$(1)^3 - 7(1)^2 + k(1) - 10 = 0$

$1 - 7 + k - 10 = 0$

$k = 10 + 7 - 1$

$k = 16$

⑤ $p(x) = x^3 - 7x^2 + 16x - 10 = (x-1)(x^2 - 6x + 10)$

$x=1$

$x^2 - 6x + 10$

$x = \frac{6 \pm \sqrt{36 - 4 \cdot 10}}{2} = \frac{6 \pm 2j}{2} = 3 \pm j$

$$\lambda_2 = 3 + j$$

$$\lambda_3 = 3 - j$$

$$\textcircled{5} \text{ a) } P(x) = x(x-2)(x+2) \quad \textcircled{\text{III}}$$

$$\text{b) } Q(x) = -x^2(x-2)(x+2) \quad \textcircled{\text{I}}$$

$$\text{c) } S(x) = x^4(x-2)(x+2) \quad \textcircled{\text{II}}$$

$$\text{d) } T(x) = -x^2(x-2) \quad \textcircled{\text{IV}}$$