

TEMA 5: POLINOMIOS: Factorización de polinomios

1. Factoriza los polinomios:

a) $P(x) = x^3 - 3x^2 + 4$

c) $P(x) = x^4 - 2x^2 + 1$

b) $P(x) = x^4 + 4x^3 + 4x^2$

d) $P(x) = x^4 + 5x^3 + 3x^2 - 9x$

a) $P(x) = x^3 - 3x^2 + 4 = (x + 1) \cdot (x - 2)^2$

	1	-3	0	4
-1		-1	4	-4
	1	-4	4	0
2		2	-4	
	1	-2	0	

b) $P(x) = x^4 + 4x^3 + 4x^2 = x^2 \cdot (x^2 + 4x + 4) = x^2 \cdot (x + 2)^2$

c) $P(x) = x^4 - 2x^2 + 1 = (x^2 - 1)^2 = (x - 1)^2 \cdot (x + 1)^2$

d) $P(x) = x^4 + 5x^3 + 3x^2 - 9x = x \cdot (x^3 + 5x^2 + 3x - 9) = x \cdot (x - 1) \cdot (x + 3)^2$

	1	5	3	-9
1		1	6	9
	1	6	9	0
-3		-3	-9	
	1	3	0	

2. Simplifica las siguientes fracciones algebraicas.

a) $\frac{x^2 + 8x + 15}{x^2 - x - 12}$

b) $\frac{x^2 + 2x + 1}{x + 1}$

c) $\frac{x^3 + 8x^2 + 21x + 18}{x^2 + 5x + 6}$

a) $\frac{x^2 + 8x + 15}{x^2 - x - 12} = \frac{(x + 3) \cdot (x + 5)}{(x - 4) \cdot (x + 3)} = \frac{x + 5}{x - 4}$

$$x^2 + 8x + 15 = 0 \Rightarrow x = \frac{-8 \pm \sqrt{64 - 60}}{2} = \frac{-8 \pm 2}{2} = \begin{cases} -5 \\ -3 \end{cases} \Rightarrow x^2 + 8x + 15 = (x + 3) \cdot (x + 5)$$

$$x^2 - x - 12 = 0 \Rightarrow x = \frac{1 \pm \sqrt{1 + 48}}{2} = \frac{1 \pm 7}{2} = \begin{cases} 4 \\ -3 \end{cases} \Rightarrow x^2 - x - 12 = (x + 3) \cdot (x - 4)$$

b) $\frac{x^2 + 2x + 1}{x + 1} = \frac{(x + 1)^2}{x + 1} = x + 1$

c) $\frac{x^3 + 8x^2 + 21x + 18}{x^2 + 5x + 6} = \frac{(x + 2) \cdot (x + 3)^2}{(x + 2) \cdot (x + 3)} = x + 3$

$$x^3 + 8x^2 + 21x + 18 = (x + 1) \cdot (x + 2) \cdot (x - 7) \quad x^2 + 5x + 6 = 0 \Rightarrow x = \frac{-5 \pm \sqrt{25 - 24}}{2} = \frac{-5 \pm 1}{2} = \begin{cases} -2 \\ -3 \end{cases}$$

	1	8	21	18
-2		-2	-12	-18
	1	6	9	0
-3		-3	-9	
	1	3	0	

$$x^2 + 5x + 6 = 0 \Rightarrow x = \frac{-5 \pm \sqrt{25 - 24}}{2} = \frac{-5 \pm 1}{2} = \begin{cases} -2 \\ -3 \end{cases} \Rightarrow x^2 + 5x + 6 = (x + 3) \cdot (x + 2)$$