

**Ejercicio 1.**

Extrae factor común en las siguientes expresiones algebraicas:

$$2x^2y^3 - 6x^2y^2 + 4x^3y = 2x^2y(y^2 - 3y + 2x)$$

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

**Ejercicio 2.**

Calcula y simplifica:

$$\begin{aligned} a) \quad \frac{x^2+2x}{4} + \frac{3(x-2)}{2} - \frac{(x+3)^2}{6} + x &= \frac{3(x^2+2x)}{12} + \frac{18(x-2)}{12} - \frac{2(x+3)^2}{12} + \frac{12x}{12} = \\ &= \frac{3x^2+6x+18x-36-2(x^2+6x+9)+12x}{12} = \frac{3x^2+6x+18x-36-2x^2-12x-18+12x}{12} = \\ &= \frac{x^2+24x-54}{12} \end{aligned}$$

$$\begin{aligned} b) \quad x(x+1)^2 - (2x-1)^2 + (3-2x)(3+2x) &= x(x^2+2x+1) - (4x^2-4x+1) + (9-4x^2) = \\ &= x^3+2x^2+x-4x^2+4x-1+9-4x^2 = x^3+2x^2+5x+8 \end{aligned}$$

**Ejercicio 3.**

Simplifica las siguientes fracciones algebraicas:

$$a) \quad \frac{2x-4}{x^2-2x} = \frac{2(x-2)}{x(x-2)} = \frac{2}{x}$$

$$b) \quad \frac{x^3-6x^2+9x}{x^3-9x} = \frac{x(x^2-6x+9)}{x(x^2-9)} = \frac{x(x-3)^2}{x(x+3)(x-3)} = \frac{x(x-3)(x-3)}{x(x+3)(x-3)} = \frac{x-3}{x+3}$$

**Ejercicio 4.**

Sean  $p(x) = x^2 + 2x - 2$ ,  $q(x) = x^2 - 3x + 1$  y  $r(x) = 2x - x^2 + 3$ ; calcula el valor de

$$p(x) \cdot [q(x) - r(x)]$$

$$\begin{aligned} p(x) \cdot [q(x) - r(x)] &= (x^2 + 2x - 2) \cdot [(x^2 - 3x + 1) - (2x - x^2 + 3)] = (x^2 + 2x - 2) \cdot [x^2 - 3x + 1 - 2x + x^2 - 3] = \\ &= (x^2 + 2x - 2) \cdot (2x^2 - 5x - 2) = 2x^4 - 5x^3 - 2x^2 + 4x^3 - 10x^2 - 4x - 4x^2 + 10x + 4 = 2x^4 - x^3 - 16x^2 + 6x + 4 \end{aligned}$$

**Ejercicio 5.**

Sean los polinomios  $p(x) = [2(x+2) - x(2x-2)^2]$  y  $q(x) = ax^3 + 2ax^2 - x + 4$ ,

- Calcula el valor numérico del polinomio  $p(x)$  para  $x = -2$ .
- Calcula  $a$ , para que el valor numérico de  $q(x)$  en  $x = -1$  sea cero.

$$p(x) = [2(x+2) - x(2x-2)^2] = 2x+4 - x(4x^2 - 8x + 4) = 2x+4 - 4x^3 + 8x^2 - 4x = -4x^3 + 8x^2 - 2x + 4$$

$$p(x) = -4x^3 + 8x^2 - 2x + 4 \Rightarrow p(-2) = -4 \cdot (-2)^3 + 8 \cdot (-2)^2 - 2 \cdot (-2) + 4 = -4 \cdot (-8) + 8 \cdot 4 + 4 + 4 = \boxed{72}$$

También se puede sustituir directamente:

$$p(-2) = 2 \cdot (-2+2) - (-2) \cdot [2 \cdot (-2) - 2]^2 = 2 \cdot 0 - (-2) \cdot [-4-2]^2 = 2 \cdot (-6)^2 = 2 \cdot 36 = 72$$

$$q(x) = ax^3 + 2ax^2 - x + 4 \Rightarrow q(-1) = 0 \Rightarrow q(-1) = a(-1)^3 + 2a(-1)^2 - (-1) + 4 \Rightarrow$$

$$\Rightarrow q(-1) = -a + 2a + 1 + 4 = a + 5 \Rightarrow a + 5 = 0 \Rightarrow \boxed{a = -5}$$

**Ejercicio 6.**

Realiza las operaciones y simplifica:

$$a) \frac{x+1}{x-1} - \frac{x^2+1}{x^2-x} = \frac{x+1}{x-1} - \frac{x^2+1}{x(x-1)} = \frac{x(x+1)}{x(x-1)} - \frac{x^2+1}{x(x-1)} = \frac{x^2+x-x^2-1}{x(x-1)} = \frac{\cancel{(x-1)}}{x\cancel{(x-1)}} = \boxed{\frac{1}{x}}$$

$$m.c.m.\{(x-1), x \cdot (x-1)\} = x \cdot (x-1)$$

$$b) \frac{x+2}{x+3} : \frac{x^2+4x+4}{x^2-9} = \frac{(x+2)(x^2-9)}{(x+3)(x^2+4x+4)} = \frac{(x+2)(x+3)(x-3)}{(x+3)(x+2)^2} = \frac{\cancel{(x+2)} \cancel{(x+3)} (x-3)}{\cancel{(x+3)} \cancel{(x+2)} (x+2)} = \boxed{\frac{(x-3)}{(x+2)}}$$