

EXAMEN DE MATEMÁTICAS APLICADAS I. EXPR. ALG. Y ECUACIONES.

$$1. \quad 2(3x-1)^2 + 5(3x-1)(3x+1) - 4x(3x+2)^2 = 2(9x^2 - 6x + 1) + 5(9x^2 - 1) - 4x(9x^2 + 12x + 4) = 18x^2 - 12x + 2 + 45x^2 - 5 - 36x^3 - 48x^2 - 16x = -36x^3 + 15x^2 - 28x - 3$$

$$2. \quad -x^3 + 3x^2 + Kx + 7 : x + 2$$

Método I: Ruffini

$$\begin{array}{r|rrrrr} -2 & -1 & 3 & K & 7 & \\ & 2 & -10 & -2(K-10) & 7-2K+20 & \\ \hline & -1 & 5 & K-10 & 7-2K+20 & \end{array} \Rightarrow 7-2K+20 = 0 \Rightarrow -2K = -7-7-20 = -34 \Rightarrow K = \frac{-34}{-2} = 17$$

Método II: Tma. resto : $P(-2) = -7 \Rightarrow -(-2)^3 + 3(-2)^2 + K(-2) + 7 = -7$
 $\Rightarrow 8 + 12 - 2K + 7 = -7 \Rightarrow -2K = -34 \Rightarrow K = 17$

$$3. \quad \frac{6x^4 + 3x^3 - 33x^2 + 33x - 9}{2x^4 - 3x^3 - 17x^2 + 27x - 9}$$

$$\begin{array}{r|rrrrr} 1 & 6 & 3 & -33 & 33 & -9 \\ & & 6 & 9 & -24 & 9 \\ \hline & 6 & 9 & -24 & 9 & 0 \\ 1 & & 6 & 15 & -9 & \\ \hline & 6 & 15 & -9 & 0 & \end{array}$$

$$6x^2 + 15x - 9 = 0$$

$$x = \frac{-15 \pm \sqrt{441}}{12} = \frac{-15 \pm 21}{12} \rightarrow \frac{6}{12} = \frac{1}{2} \quad \vee \quad -3$$

$$2x^4 - 3x^3 - 17x^2 + 27x - 9$$

$$\begin{array}{r|rrrrr} 1 & 2 & -3 & -17 & 27 & -9 \\ & & 2 & -1 & -18 & 9 \\ \hline & 2 & -1 & -18 & 9 & 0 \\ 3 & & 6 & 15 & -9 & \\ \hline & 2 & 5 & -3 & 0 & \end{array}$$

$$2x^2 + 5x - 3 = 0$$

$$x = \frac{-5 \pm 7}{4} = \frac{-5+7}{4} = \frac{2}{4} = \frac{1}{2} \quad \vee \quad -3$$

$$\frac{6x^4 + 3x^3 - 33x^2 + 33x - 9}{2x^4 - 3x^3 - 17x^2 + 27x - 9} = \frac{(x-1)^2 \cdot 6 \cdot (x+3) \cdot (x-\frac{1}{2})}{(x-1)(x-3) \cdot 2 \cdot (x+3) \cdot (x-\frac{1}{2})} =$$

$$= \frac{3(x-1)}{x-3}$$

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

4.

$$\left(\frac{1}{x-1} - \frac{2x}{x^2-1} \right) : \frac{x}{x+1} = \left(\frac{x+1}{(x+1)(x-1)} - \frac{2x}{(x+1)(x-1)} \right) : \frac{x}{x+1} =$$

$$= \frac{x+1-2x}{(x+1)(x-1)} : \frac{x}{x+1} = \frac{1-x}{(x+1)(x-1)} : \frac{x}{x+1} = \frac{(1-x)(x+1)}{x(x+1)(x-1)} =$$

$$= \frac{-\cancel{(x-1)}(x+1)}{x(\cancel{x+1})(x-1)} = -\frac{1}{x}$$

5. $6x^4 + 5x^3 - 14x^2 + x + 2 = 0$

a)

6	5	-14	1	2	
1	6	11	-3	-2	
6	11	-3	-2	0	
-2	-12	2	2		
6	-1	-1	0		

$$6x^2 - x - 1 = 0 \Rightarrow x = \frac{1 \pm 5}{12} = \begin{matrix} \nearrow \frac{1}{2} \\ \searrow -\frac{1}{3} \end{matrix}$$

$$6(x-1)(x+2)(x-\frac{1}{2})(x+\frac{1}{3}) = 0 \quad \text{ó} \quad (x-1)(x+2)(2x-1)(3x+1) = 0$$

b) SOL: $x=1$; $x=-2$; $x=\frac{1}{2}$; $x=-\frac{1}{3}$

6.

$$\frac{10}{3} + \frac{5-x}{x+5} = \frac{x+5}{x-5} \Rightarrow \frac{10(x+5)(x-5)}{3(x+5)(x-5)} + \frac{3(x-5)(5-x)}{3(x+5)(x-5)} = \frac{3(x+5)^2}{3(x+5)(x-5)}$$

$$\Rightarrow 10(x+5)(x-5) + 3(x-5)(5-x) = 3(x+5)^2 \Rightarrow 10(x^2-25) + 3(5x-25-x^2+5x) = 3(x^2+10x+25)$$

$$\Rightarrow 10x^2 - 250 + 15x - 75 - 3x^2 + 15x = 3x^2 + 30x + 75 \Rightarrow 4x^2 - 400 = 0 \Rightarrow x^2 = 100$$

$$\Rightarrow x = \pm \sqrt{100} = \begin{matrix} \nearrow +10 \\ \searrow -10 \end{matrix} \text{ si VALE}$$

COMPROBAMOS:

$$x=10 \Rightarrow \frac{10}{3} + \frac{-5}{15} = \frac{15}{5} \Rightarrow \frac{10}{3} - \frac{1}{3} = 3 \Rightarrow 3=3$$

$$x=-10 \Rightarrow \frac{10}{3} + \frac{15}{-5} = \frac{-5}{-15} \Rightarrow \frac{10}{3} - \frac{3}{3} = \frac{1}{3} \Rightarrow \frac{1}{3} = \frac{1}{3}$$

7.

$\sqrt{x^2 + (5-x)^2} = \sqrt{x^2 + 25 - 10x + x^2} = \sqrt{2x^2 - 10x + 25}$

a) $P = 4 \sqrt{2x^2 - 10x + 25}$

8. Se fabrican y venden x unidades diarias:

Costes: $C(x) = 500 + 12x$

Ingresos: $I(x) = \left(50 - \frac{x}{2}\right) \cdot x = 50x - \frac{x^2}{2}$

Beneficios: $B(x) = I(x) - C(x) = \left(50x - \frac{x^2}{2}\right) - (500 + 12x) = -\frac{x^2}{2} + 38x - 500$

si $x=50 \Rightarrow B(50) = -\frac{50^2}{2} + 38 \cdot 50 - 500 = 150 \text{ € diarias}$