

EXAMEN DE MATEMÁTICAS APLICADAS I. ECUACIONES.

1. Resuelve la siguiente ecuación bicuadrada, mediante un cambio de variable:

$$-2x^4 - 2x^2 + 12 = 0; \text{ cambio } x^2 = t \Rightarrow -2t^2 - 2t + 12 = 0 \Rightarrow$$

$$\Rightarrow t = \frac{2 \pm \sqrt{100}}{-4} = \frac{2 \pm 10}{-4} \begin{cases} \rightarrow t = 2 \Rightarrow x^2 = 2 \Rightarrow x = \sqrt{2} \text{ o } -\sqrt{2} \\ \rightarrow t = -3 \Rightarrow x^2 = -3 \Rightarrow \text{NO SOL.} \end{cases}$$

2. $6x^3 - 7x^2 - x + 2 = 0$

1	6	-7	-1	2	$6x^2 - x - 2 = 0 \Rightarrow x = \frac{1 \pm \sqrt{49}}{12} = \frac{1 \pm 7}{12} \begin{cases} \rightarrow \frac{8}{12} = \frac{2}{3} \\ \rightarrow -\frac{6}{12} = -\frac{1}{2} \end{cases}$
	6	-1	-2		
6	-1	-2	0		

Ec. factorizada: $6(x-1)(x-\frac{2}{3})(x+\frac{1}{2}) = 0$ ó $(x-1)(3x-2)(2x+1) = 0$

Sol: $x-1=0 \Rightarrow \boxed{x=1}$

$x-\frac{2}{3}=0 \Rightarrow \boxed{x=\frac{2}{3}}$

$x+\frac{1}{2}=0 \Rightarrow \boxed{x=-\frac{1}{2}}$

3. $\sqrt{x+5} + \sqrt{2x+8} = 7 \Rightarrow (\sqrt{x+5})^2 = (7 - \sqrt{2x+8})^2 \Rightarrow$

$\Rightarrow x+5 = 49 + 2x+8 - 14\sqrt{2x+8} \Rightarrow x+5-49-2x-8 = -14\sqrt{2x+8} \Rightarrow$

$\Rightarrow -x-52 = -14\sqrt{2x+8} \Rightarrow (x+52)^2 = (14\sqrt{2x+8})^2 \Rightarrow x^2 + 104x + 2704 = 196(2x+8)$

$\Rightarrow x^2 + 104x + 2704 = 392x + 1568 \Rightarrow x^2 - 288x + 1136 = 0 \Rightarrow x = \frac{288 \pm \sqrt{78400}}{2} =$

$= \frac{288 \pm 280}{2} = \begin{cases} \rightarrow 284 \text{ NO VALE} \\ \rightarrow \underline{\underline{4}} \text{ SI VALE} \end{cases}$

COMPROBAMOS:

$x=284 \Rightarrow 17+24 \neq 7$

$x=4 \Rightarrow 3+4 = 7$

$$4. \frac{x+1}{2x-1} - \frac{7}{4x^2-1} = \frac{x}{2x+1} \Rightarrow \frac{(2x+1)(x+1)}{(2x-1)(2x+1)} - \frac{7}{(2x-1)(2x+1)} = \frac{(2x-1) \cdot x}{(2x-1)(2x+1)}$$

$$\Rightarrow (2x+1)(x+1) - 7 = x(2x-1) \Rightarrow 2x^2 + x + 2x + 1 - 7 = 2x^2 - x$$

$$\Rightarrow x + 2x + x = -1 + 7 \Rightarrow 4x = 6 \Rightarrow \boxed{x = \frac{3}{2}} \text{ SI' VALE}$$

$$\frac{\frac{3}{2} + 1}{2 \cdot \frac{3}{2} - 1} - \frac{7}{4 \cdot \frac{9}{4} - 1} = \frac{\frac{3}{2}}{2 \cdot \frac{3}{2} + 1} \Rightarrow \frac{\frac{5}{2}}{2} - \frac{7}{8} = \frac{\frac{3}{2}}{4}$$

$$\Rightarrow \frac{5}{4} - \frac{7}{8} = \frac{3}{8} \Rightarrow \frac{10}{8} - \frac{7}{8} = \frac{3}{8} \Rightarrow \frac{3}{8} = \frac{3}{8}$$

$$6. \frac{\log(16-x^2)}{\log(3x-4)} = 2 \Rightarrow \log(16-x^2) = 2 \log(3x-4) \Rightarrow$$

$$\Rightarrow \log(16-x^2) = \log(3x-4)^2 \Rightarrow 16-x^2 = (3x-4)^2 \Rightarrow 16-x^2 = 9x^2 + 16 - 24x$$

$$\Rightarrow 10x^2 - 24x = 0 \Rightarrow x(10x-24) = 0 \begin{cases} \rightarrow x=0 \text{ NO VALE} \\ \rightarrow 10x-24=0 \Rightarrow x = \frac{12}{5} \text{ SI' VALE} \end{cases}$$

$$16 - \left(\frac{12}{5}\right)^2 = 16 - \frac{144}{25} = \frac{256}{25} > 0$$

$$3 \cdot \frac{12}{5} - 4 = \frac{36}{5} - 4 = \frac{16}{5} > 0$$

$$5. 3 \cdot 4^x + 16^x = 304, \quad 4^x = t$$

$$3 \cdot 4^x + (4^x)^2 = 304 \Rightarrow 3t + t^2 = 304 \Rightarrow t^2 + 3t - 304 = 0$$

$$\Rightarrow t = \frac{-3 \pm \sqrt{1225}}{2} = \frac{-3 \pm 35}{2} \begin{cases} \rightarrow 16 \Rightarrow 4^x = 16 \Rightarrow 4^x = 4^2 \Rightarrow x = 2 \\ \rightarrow -19 \Rightarrow 4^x = -19 \text{ NO SOL} \end{cases}$$

$$7. \log_2 (x-3) - \log_2 (2x+21) = 1 - \log_2 (x-2)$$

$$\Rightarrow \log_2 (x-3) - \log_2 (2x+21) = \log_2 2^1 - \log_2 (x-2) \Rightarrow$$

$$\Rightarrow \log_2 \frac{x-3}{2x+21} = \log_2 \frac{2}{x-2} \Rightarrow \frac{x-3}{2x+21} = \frac{2}{x-2}$$

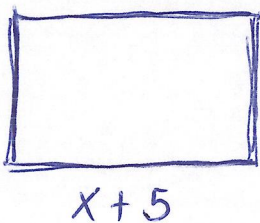
$$\Rightarrow (x-3)(x-2) = 2(2x+21) \Rightarrow x^2 - 3x - 2x + 6 = 4x + 42 \Rightarrow x^2 - 9x - 36 = 0$$

$$\Rightarrow x = \frac{9 \pm \sqrt{225}}{2} = \frac{9 \pm 15}{2} = \begin{cases} \rightarrow 12 \text{ SI VALE} \\ \rightarrow -3 \text{ NO VALE} \end{cases}$$

Compr. :

$$\begin{array}{l} 12-3 > 0 \quad 12-2 > 0 \\ 2 \times 12 + 21 > 0 \\ \hline -3-3 < 0 \end{array}$$

8. $x = n^\circ$ ordenadores con descuento del 20%



$$(x+5+5) \cdot (x+5) = 3x(x+5)$$

$$(x+10) \cdot (x+5) = 3x^2 + 15x \Rightarrow$$

$$\Rightarrow x^2 + 10x + 5x + 50 = 3x^2 + 15x \Rightarrow 2x^2 - 50 = 0 \Rightarrow$$

$$\Rightarrow 2x^2 = 50 \Rightarrow x^2 = 25 \Rightarrow x = \pm \sqrt{25} \begin{cases} \rightarrow +5 \\ \rightarrow -5 \text{ NO VALE} \end{cases}$$

SOL: Dimensiones 5m x 10m