

Examen de Matemáticas 4º de ESO

Diciembre 2011

Resolver las siguientes ecuaciones y sistemas:

Problema 1

$$\log(3x^2 + 15) - 1 = 2 \log(x + 1)$$

Solución:

$$\log\left(\frac{3x^2 + 15}{10}\right) = \log(x + 1)^2 \implies 7x^2 + 20x - 5 = 0 \implies$$

$$\begin{cases} x = 0,231 \\ x = -3,088 \text{ No Vale} \end{cases}$$

Problema 2

$$2^{2x-1} + 2^{x+2} - 3 = 0$$

Solución:

$$\frac{(2^x)^2}{2} + 4 \cdot 2^x - 3 = 0 \implies \frac{t^2}{2} + 4t - 3 = 0 \implies \begin{cases} t = 0,69 \\ t = -8,69 \end{cases}$$

$$\begin{cases} t = 0,69 = 2^x \implies x = -0,534 \\ t = -8,69 = 2^x \implies \text{No Vale} \end{cases}$$

Problema 3

$$\begin{cases} \log(xy^2) &= 5 \\ \log\left(\frac{x^2}{y}\right) &= 0 \end{cases}$$

Solución:

$$\begin{cases} \log(xy^2) &= 5 \\ \log\left(\frac{x^2}{y}\right) &= 0 \end{cases} \implies \begin{cases} u+ & 2v = & 5 \\ 2u- & v = & 0 \end{cases} \implies$$

$$\begin{cases} u = \log x = 1 \implies x = 10 \\ v = \log y = 2 \implies y = 100 \end{cases}$$

Problema 4

$$\begin{cases} 2^{x+1} - & 3^{y+1} &= & -3 \\ 2^{x-1} + & 3^y &= & 8 \end{cases}$$

Solución:

$$\begin{cases} 2 \cdot 2^x - 3 \cdot 3^y = -3 \\ \frac{2^x}{2} + 3^y = 8 \end{cases} \Rightarrow \begin{cases} 2u - 3v = -3 \\ u + 2v = 16 \end{cases} \Rightarrow \begin{cases} u = 6 = 2^x \Rightarrow x = 2,585 \\ v = 5 = 3^y \Rightarrow y = 1,465 \end{cases}$$

Problema 5

$$\frac{x}{15} - \frac{x-2}{5} \leq 1 - \frac{x-3}{9}$$

Solución:

$$3x - 9x + 18 \leq 45 - 5x + 15 \Rightarrow -42 \leq x \Rightarrow [-42, \infty)$$

Problema 6

$$\frac{x^2 - x - 6}{x - 5} \geq 0$$

Solución:

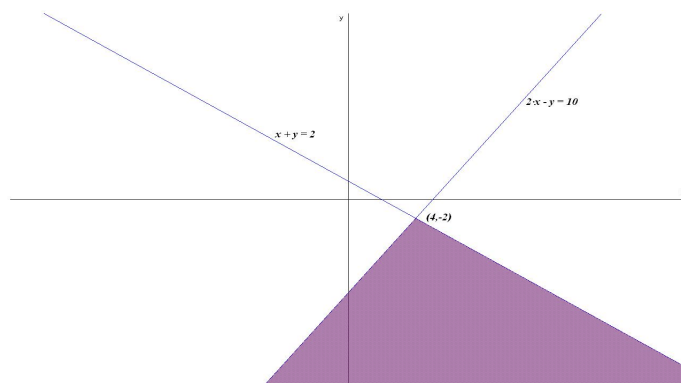
$$\frac{x^2 - x - 6}{x - 5} = \frac{(x+2)(x-3)}{x-5} \geq 0$$

La solución es: $[-2, 3] \cup (5, \infty)$

Problema 7

$$\begin{cases} x + y \leq 2 \\ 2x - y \geq 10 \end{cases}$$

Solución:



$$2x - y = 10 \Rightarrow \begin{array}{c|c} x & y \\ \hline 0 & -10 \\ 5 & 0 \end{array}$$

$$x + y = 2 \implies \begin{array}{c|c} x & y \\ \hline 0 & 2 \\ 2 & 0 \end{array}$$

$$\begin{cases} 2x - y = 10 \\ x + y = 2 \end{cases} \implies \begin{cases} x = 4 \\ y = -2 \end{cases} \implies (4, -2)$$

Problema 8

$$\sqrt{3x-1} = 2$$

Solución:

$$(\sqrt{3x-1})^2 = 2^2 \implies 3x-1 = 4 \implies x = 5/3$$

Problema 9

$$\sqrt{4x+1} - \sqrt{x+2} = 1$$

Solución:

$$\sqrt{4x+1} = 1 + \sqrt{x+2} \implies 4x+1 = 1 + x + 2 + 2\sqrt{x+2} \implies 3x-2 = 2\sqrt{x+2} \implies$$

$$9x^2 - 16x - 4 = 0 \implies x = 2, \quad x = -2/9 \text{ no vale}$$

Problema 10

$$x^4 - 3x^2 + 2 = 0$$

Solución:

$$\text{Hacemos } z = x^2 \implies z^2 - 3z + 2 = 0 \implies z = 1 \text{ y } z = 2.$$

$$z = 1 = x^2 \implies x = \pm 1$$

$$z = 2 = x^2 \implies x = \pm\sqrt{2}$$