

Examen de Matemáticas 4º de ESO

Diciembre 2011

Resolver las siguientes ecuaciones y sistemas:

Problema 1

$$\log(10x^2 + 5) - 2 = \log x$$

Solución:

$$\log\left(\frac{10x^2 + 5}{100}\right) = \log x \implies 10x^2 - 100x + 5 = 0 \implies$$

$$\begin{cases} x = 9,95 \\ x = 0,05 \end{cases}$$

Problema 2

$$5^{2x-1} - 2 \cdot 5^{x+1} - 2 = 0$$

Solución:

$$\frac{(5^x)^2}{5} + 10 \cdot 5^x - 2 = 0 \implies \frac{t^2}{5} + 10t - 2 = 0 \implies \begin{cases} t = 50,199 \\ t = -0,199 \end{cases}$$

$$\begin{cases} t = 50,199 = 5^x \implies x = 2,433 \\ t = -0,199 = 5^x \implies \text{No Vale} \end{cases}$$

Problema 3

$$\begin{cases} \log(xy^3) &= 6 \\ \log\left(\frac{x}{y}\right) &= 2 \end{cases}$$

Solución:

$$\begin{cases} \log(xy^3) &= 6 \\ \log\left(\frac{x}{y}\right) &= 2 \end{cases} \implies \begin{cases} u+ & 3v = 6 \\ u- & v = 2 \end{cases} \implies$$

$$\begin{cases} u = \log x = 3 \implies x = 1000 \\ v = \log y = 1 \implies y = 10 \end{cases}$$

Problema 4

$$\begin{cases} 2^{x-1} - 3^y &= -2 \\ 2^{x+1} + 3^{y+1} &= 27 \end{cases}$$

Solución:

$$\begin{cases} \frac{2^x}{2} - 3^y = -2 \\ 2 \cdot 2^x + 3 \cdot 3^y = 27 \end{cases} \implies \begin{cases} u - 2v = -4 \\ 2u + 3v = 27 \end{cases} \implies \begin{cases} u = 6 = 2^x \implies x = 2,585 \\ v = 5 = 3^y \implies y = 1,465 \end{cases}$$

Problema 5

$$1 - \frac{x+5}{14} \leq \frac{2x+1}{2} - \frac{x-1}{7}$$

Solución:

$$14 - x - 5 \leq 12x + 9 \implies 0 \leq x \implies [0, \infty)$$

Problema 6

$$\frac{x^2 + 2x - 8}{x - 3} \geq 0$$

Solución:

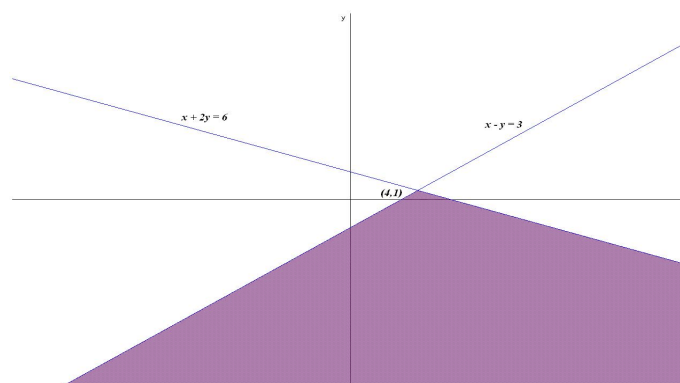
$$\frac{x^2 + 2x - 8}{x - 3} = \frac{(x+4)(x-2)}{x-3} \geq 0$$

La solución es: $[-4, 2] \cup (3, \infty)$

Problema 7

$$\begin{cases} x + 2y \leq 6 \\ x - y \geq 3 \end{cases}$$

Solución:



$$x + 2y = 6 \implies \begin{array}{c|c} x & y \\ \hline 0 & 3 \\ 6 & 0 \end{array}$$

$$x - y = 3 \implies \begin{array}{c|c} x & y \\ \hline 0 & -3 \\ 3 & 0 \end{array}$$

$$\begin{cases} x - y = 3 \\ x + 2y = 6 \end{cases} \implies \begin{cases} x = 4 \\ y = 1 \end{cases} \implies (4, 1)$$

Problema 8

$$\sqrt{7x - 2} = 5$$

Solución:

$$(\sqrt{7x - 2})^2 = 5^2 \implies 7x - 2 = 25 \implies x = 27/7$$

Problema 9

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

Solución:

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

$$x - 1 = 2\sqrt{x - 1} \implies x^2 - 6x + 5 = 0 \implies x = 1, x = 5$$

Problema 10

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

Solución:

Hacemos $z = x^2 \implies z^2 - 7z + 12 = 0 \implies z = 1 \text{ y } z = 3$.

$$z = 3 = x^2 \implies x = \pm\sqrt{3}$$

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