

Examen de Matemáticas 4º de ESO

Noviembre 2005

Resolver las siguientes ecuaciones y sistemas:

Problema 1

$$2 \log x - \log(3x - 1) = 1$$

Solución:

$$\log \left(\frac{x^2}{3x - 1} \right) = \log 10 \implies x^2 - 30x + 10 = 0 \implies$$

$$\begin{cases} x = 29,66287829 \\ x = 0,3371217013 \end{cases}$$

Problema 2

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

Solución:

$$\frac{(5^x)^2}{5} + 2 \cdot 5^x - 2 = 0 \implies \frac{t^2}{6} + 2t - 2 = 0 \implies \begin{cases} t = 0,9160797830 \\ t = -10,91607978 \end{cases}$$

$$\begin{cases} t = 0,9160797830 = 5^x \implies x = -0,05446113695 \\ t = -10,91607978 = 5^x \implies \text{No Vale} \end{cases}$$

Problema 3

$$\begin{cases} \log(x^2 y^2) = 4 \\ \log \left(\frac{x}{y^2} \right) = 2 \end{cases}$$

Solución:

$$\begin{cases} 2 \log x + 2 \log y = 4 \\ \log x - 2 \log y = 2 \end{cases} \implies \begin{cases} 2u + 2v = 4 \\ u - 2v = 2 \end{cases} \implies$$

$$\begin{cases} u = \log x = 2 \implies x = 100 \\ v = \log y = 0 \implies y = 1 \end{cases}$$

Problema 4

$$\begin{cases} 3^{x-1} - 2^{y+1} = 1 \\ 3^x + 2^y = 4 \end{cases}$$

Solución:

$$\begin{cases} \frac{3^x}{3} - 2 \cdot 2^y = 1 \\ 3^x + 2^y = 4 \end{cases} \implies \begin{cases} \frac{u}{3} - 2v = 1 \\ u + v = 4 \end{cases} \implies \begin{cases} u = \frac{27}{7} = 3^x \implies x = 1,228756250 \\ v = \frac{1}{7} = 2^y \implies y = -2,807354922 \end{cases}$$

Problema 5

$$\frac{2x-1}{10} - 1 \geq \frac{x}{2} - \frac{x-1}{5}$$

Solución:

$$2x - 11 \geq 3x + 2 \implies -x \geq 13 \implies x \leq -13 \implies (-\infty, -13]$$

Problema 6

$$\frac{x^2 + 2x - 35}{x + 1} \leq 0$$

Solución:

$$\frac{x^2 + 2x - 35}{x + 1} = \frac{(x - 5)(x + 7)}{x + 1} \leq 0$$

	$(-\infty, -7)$	$(-7, -1)$	$(-1, 5)$	$(5, \infty)$
$x + 7$	−	+	+	+
$x + 1$	−	−	+	+
$x - 5$	−	−	−	+
$\frac{x^2+2x-35}{x+1}$	−	+	−	+

La solución es: $(-\infty, -7] \cup (-1, 5]$

Problema 7

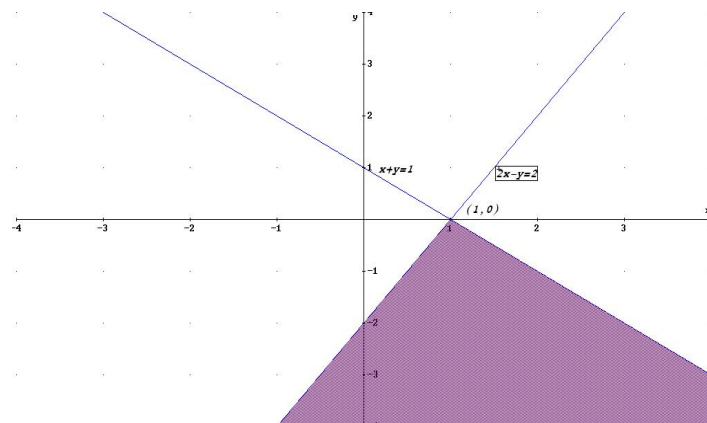
$$\begin{cases} 2x - y \geq 2 \\ x + y < 1 \end{cases}$$

Solución:

$$2x - y = 2 \implies \begin{array}{c|c} x & y \\ \hline 0 & -2 \\ 1 & 0 \end{array}$$

$$x + y = 1 \Rightarrow \begin{array}{c|c} x & y \\ \hline 0 & 1 \\ 1 & 0 \end{array}$$

$$\begin{cases} 2x - y = 2 \\ x + y = 1 \end{cases} \Rightarrow \begin{cases} x = 1 \\ y = 0 \end{cases} \Rightarrow (1, 0)$$



Problema 8

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

Solución:

$$3x + 4 = x^2 - 4x + 4 \Rightarrow x(x - 7) = 0 \Rightarrow x = 0, \text{ (no vale)}, x = 7$$

Problema 9

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

Solución:

$$\sqrt{x+4} = 1 + \sqrt{x} \Rightarrow x + 4 = 1 + x + 2\sqrt{x} \Rightarrow 3 = 2\sqrt{x} \Rightarrow x = \frac{9}{4}$$

Problema 10

$$x^4 - 15x^2 - 16 = 0$$

Solución:

$$\text{Hacemos } z = x^2 \Rightarrow z^2 - 15z - 16 = 0 \Rightarrow z = 16 \text{ y } z = -1.$$

$$z = 16 = x^2 \Rightarrow x = \pm 4$$

$$z = -1 = x^2 \text{ No Vale}$$