

Examen de Matemáticas 4º de ESO
Noviembre 2007

Resolver las siguientes ecuaciones y sistemas:

Problema 1 Resolver:

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

Solución:

1. $\log(2x + 1) + \log x = 2 \implies 2x^2 + x = 100 \implies x = 6,8255$ y $x = -7,3255$ que no vale.
2. $\log(x^2 + 1) - 2 = 2 \log x \implies 1 = 99x^2 \implies x = 0,1$ y $x = -0,1$ que no vale.

Problema 2

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

Solución:

$$2t^2 - \frac{t}{2} - 1 = 0 \implies 4t^2 - t - 2 = 0$$
$$\begin{cases} t = 2^x = -0,593 \implies \text{No Vale} \\ t = 2^x = 0,843 \implies x = -0,246 \end{cases}$$

Problema 3

$$\begin{cases} \log(xy^2) = 8 \\ \log\left(\frac{x}{y}\right) = 5 \end{cases}$$

Solución:

$$\begin{cases} \log x + 2 \log y = 8 \\ \log x - \log y = 5 \end{cases} \implies \begin{cases} u + 2v = 8 \\ u - v = 5 \end{cases} \implies$$
$$\begin{cases} u = \log x = 6 \implies x = 10^6 \\ v = \log y = 1 \implies y = 10 \end{cases}$$

Problema 4

$$\begin{cases} 2 \cdot 5^x - 3^y = 3 \\ 5^x + 3^y = 3 \end{cases}$$

Solución:

$$\begin{cases} 2 \cdot 5^x - 3^y = 3 \\ 5^x + 3^y = 3 \end{cases} \implies \begin{cases} 2u - v = 3 \\ u + v = 3 \end{cases} \implies$$

$$\begin{cases} u = 2 = 5^x \implies x = 0,43 \\ v = 1 = 3^y \implies y = 0 \end{cases}$$

Problema 5

$$\frac{x}{4} - \frac{x-1}{3} \leq 2 - \frac{x+1}{6}$$

Solución:

$$3x - 4x + 4 \leq 24 - 2x - 2 \implies x \leq 18 \implies (-\infty, 18]$$

Problema 6

$$\frac{x^2 + 5x - 14}{x - 1} \geq 0$$

Solución:

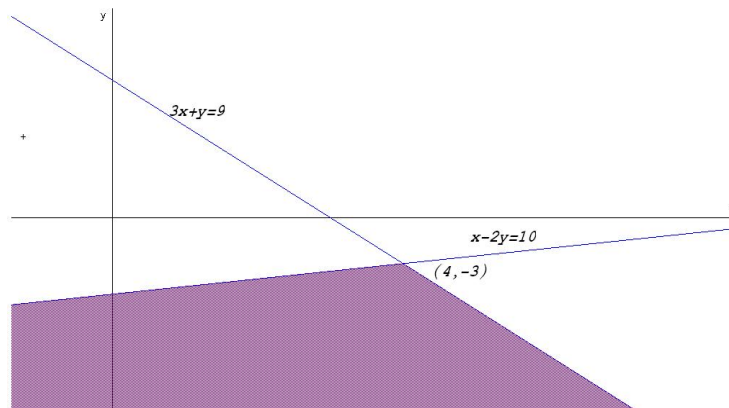
$$\frac{x^2 + 5x - 14}{x - 1} = \frac{(x+7)(x-2)}{x-1} \geq 0$$

La solución es: $[-7, 1) \cup [2, \infty)$

Problema 7

$$\begin{cases} x - 2y \geq 10 \\ 3x + y \leq 9 \end{cases}$$

Solución:



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

$$3x + y = 9 \implies \begin{array}{c|c} x & y \\ \hline 0 & 9 \\ 3 & 0 \end{array}$$

$$\begin{cases} x - 2y = 10 \\ 3x + y = 9 \end{cases} \implies \begin{cases} x = 4 \\ y = -3 \end{cases} \implies (4, -3)$$

Problema 8

$$\sqrt{x+1} + \sqrt{2x+3} = 5$$

Solución:

$$\sqrt{x+1} = 5 - \sqrt{2x+3} \implies x+1 = 25 + (2x+3) - 10\sqrt{2x+3} \implies -x-27 = -10\sqrt{2x+3}$$

$$x^2 + 54x + 729 = 200x + 300 \implies x^2 - 146x + 429 = 0$$

$$\begin{cases} x = 143 \text{ No Vale} \\ x = 3 \end{cases}$$

Problema 9

$$\sqrt{4x+1} + x = 5$$

Solución:

$$4x+1 = 25 + x^2 - 10x \implies x^2 - 14x + 24 = 0$$

$$\begin{cases} x = 2 \\ x = 12 \text{ No Vale} \end{cases}$$

Problema 10

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

Solución:

$$\text{Hacemos } z = x^2 \implies z^2 - 3z - 4 = 0 \implies z = 4 \text{ y } z = -1.$$

$$z = 4 = x^2 \implies x = \pm 2$$

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