

Examen de Matemáticas 4º de ESO

Diciembre 2011

Resolver las siguientes ecuaciones y sistemas:

Problema 1

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

Solución:

$$\log(x^2 + x - 1) = \log\left(\frac{(x+1)^2}{10}\right) \implies 9x^2 + 8x - 11 = 0 \implies$$

$$\begin{cases} x = 0,747 \\ x = -1,636 \text{ No Vale} \end{cases}$$

Problema 2

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

Solución:

$$\frac{(3^x)^2}{3} + \frac{3^x}{3} - 1 = 0 \implies \frac{t^2}{3} + \frac{t}{3} - 1 = 0 \implies \begin{cases} t = 1,303 \\ t = -2,303 \end{cases}$$

$$\begin{cases} t = 1,303 = 3^x \implies x = 0,241 \\ t = -2,303 = 3^x \implies \text{No Vale} \end{cases}$$

Problema 3

$$\begin{cases} \log(x^3 y) &= 7 \\ \log\left(\frac{x}{y}\right) &= 1 \end{cases}$$

Solución:

$$\begin{cases} \log(x^3 y) &= 7 \\ \log\left(\frac{x}{y}\right) &= 1 \end{cases} \implies \begin{cases} 3u + v &= 7 \\ u - v &= 1 \end{cases} \implies$$

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

Problema 4

$$\begin{cases} 2^{x-1} - 3^{y+1} &= -12 \\ 2^{x+1} + 3^y &= 17 \end{cases}$$

Solución:

$$\begin{cases} \frac{2^x}{2} - 3 \cdot 3^y = -12 \\ 2 \cdot 2^x + 3^y = 17 \end{cases} \implies \begin{cases} u - 6v = -24 \\ 2u + v = 17 \end{cases} \implies \begin{cases} u = 6 = 2^x \implies x = 2,585 \\ v = 5 = 3^y \implies y = 1,465 \end{cases}$$

Problema 5

$$\frac{x+1}{8} - \frac{x-1}{24} \geq 1 + \frac{x+5}{3}$$

Solución:

$$3x + 3 - x + 1 \geq 24 + 8x + 40 \implies -10 \geq x \implies (-\infty, -10]$$

Problema 6

$$\frac{x^2 - 8x + 15}{x - 1} \geq 0$$

Solución:

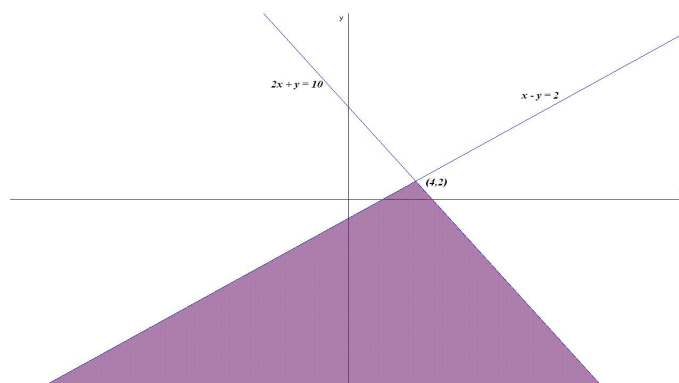
$$\frac{x^2 - 8x + 15}{x - 1} = \frac{(x-3)(x-5)}{x-1} \geq 0$$

La solución es: $\cup(1, 3] \cup [5, \infty)$

Problema 7

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

Solución:



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

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

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

Problema 8

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

Solución:

$$(\sqrt{5x + 3})^2 = 3^2 \implies 5x + 3 = 9 \implies x = 6/5$$

Problema 9

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

Solución:

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

$$x^2 - 2x - 3 = 0 \implies x = 3, x = -1$$

Problema 10

$$x^4 - 7x^2 + 12 = 0$$

Solución:

$$\text{Hacemos } z = x^2 \implies z^2 - 7z + 12 = 0 \implies z = 3 \text{ y } z = 4.$$

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

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