

Examen de Matemáticas 4º de ESO

Diciembre 2005

Resolver las siguientes ecuaciones y sistemas:

Problema 1

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

Solución:

$$\log\left(\frac{x+2}{3x+1}\right) = \log 10 \implies x = -\frac{8}{29}$$

Problema 2

$$2^{x+1} - 2^{x+3} + 5 = 0$$

Solución:

$$2 \cdot 2^x - 8 \cdot 2^x + 5 = 0 \implies 2t - 8t + 5 = 0 \implies t = \frac{5}{6}$$

$$t = 2^x = \frac{5}{6} \implies x = -0,2630344058$$

Problema 3

$$\begin{cases} \log(x^3y) = 5 \\ \log\left(\frac{x}{y}\right) = 3 \end{cases}$$

Solución:

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

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

Problema 4

$$\begin{cases} 2^{x+1} - 2 \cdot 3^y = 0 \\ 2^x + 2 \cdot 3^y = 3 \end{cases}$$

Solución:

$$\begin{cases} 2^{x+1} - 2 \cdot 3^y = 0 \\ 2^x + 2 \cdot 3^y = 3 \end{cases} \implies \begin{cases} 2u - 2v = 0 \\ u + 2v = 3 \end{cases} \implies$$

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

Problema 5

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

Solución:

$$6x + 9 - 12 \geq 6x + 2x - 2 \implies x \leq -\frac{1}{2} \implies \left(-\infty, -\frac{1}{2}\right)$$

Problema 6

$$x^2 - 5x - 14 \geq 0$$

Solución:

$$x^2 - 5x - 14 = (x - 7)(x + 2) \geq 0$$

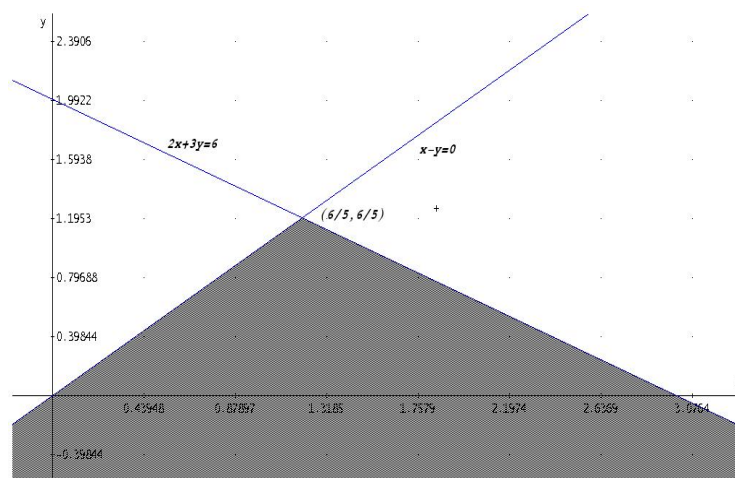
	$(-\infty, -2)$	$(-2, 7)$	$(7, \infty)$
$x + 2$	-	+	+
$x - 7$	-	-	+
$x^2 - 5x - 14$	+	-	+

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

Problema 7

$$\begin{cases} 2x + 3y \leq 6 \\ x - y \geq 0 \end{cases}$$

Solución:



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

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

$$\begin{cases} 2x + 3y = 6 \\ x - y = 0 \end{cases} \implies \begin{cases} x = 6/5 \\ y = 6/5 \end{cases} \implies (6/5, 6/5)$$

Problema 8

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

Solución:

$$3x + 4 = x^2 + 4x + 4 \implies x^2 + x = 0 \implies \begin{cases} x = 0 \\ x = -1 \end{cases}$$

Problema 9

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

Solución:

$$2x - 1 = x^2 - 4x + 4 \implies x^2 - 6x + 5 = 0 \implies \begin{cases} x = 5 \\ x = 1 \text{ No Vale} \end{cases}$$

Problema 10

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

Solución:

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

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

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