

Examen de Matemáticas 4º de ESO
Noviembre 2004

Resolver las siguientes ecuaciones y sistemas:

Problema 1

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

Solución:

$$\log\left(\frac{3x + 1}{x^2}\right) = \log 100 \implies 100x^2 - 3x - 1 = 0 \implies$$

$$\begin{cases} x = 0,116187 \\ x = -0,0861187 \text{ No Vale} \end{cases}$$

Problema 2

$$7^{2x-1} + 7^{x+1} - 1 = 0$$

Solución:

$$\frac{(7^x)^2}{7} + 7 \cdot 7^x - 1 = 0 \implies \frac{t^2}{7} + 7t - 1 = 0 \implies \begin{cases} t = 0,14244 \\ t = -49,14224 \end{cases}$$

$$\begin{cases} t = 0,14244 = 7^x \implies x = -1,0015 \\ t = -49,14224 = 7^x \implies \text{No Vale} \end{cases}$$

Problema 3

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

Solución:

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

$$\begin{cases} u = \log x = 8/5 \implies x = 39,81 \\ v = \log y = 1/5 \implies y = 1,5849 \end{cases}$$

Problema 4

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

Solución:

$$\begin{cases} \frac{3^x}{3} + 2 \cdot 2^y = 2 \\ 3^x - 2^y = 3 \end{cases} \implies \begin{cases} \frac{u}{3} + 2v = 2 \\ u - v = 3 \end{cases} \implies \begin{cases} u = \frac{24}{7} = 3^x \implies x = 1,22876 \\ v = \frac{3}{7} = 2^y \implies y = 0,89385 \end{cases}$$

Problema 5

$$\frac{x+3}{2} - \frac{2x}{7} \geq 1 - \frac{x}{14}$$

Solución:

$$7x + 21 - 4x \geq 14 - x \implies x \geq -\frac{7}{4} \implies \left[-\frac{7}{4}, \infty\right)$$

Problema 6

$$\frac{x^2 + 5x - 6}{x - 3} \geq 0$$

Solución:

$$\frac{x^2 + 5x - 6}{x - 3} = \frac{(x-1)(x+6)}{x-3} \geq 0$$

	$(-\infty, -6)$	$(-6, 1)$	$(1, 3)$	$(3, \infty)$
$x + 6$	-	+	+	+
$x - 1$	-	-	+	+
$x - 3$	-	-	-	+
$\frac{x^2+5x-6}{x-3}$	-	+	-	+

La solución es: $[-6, 1] \cup (3, \infty)$

Problema 7

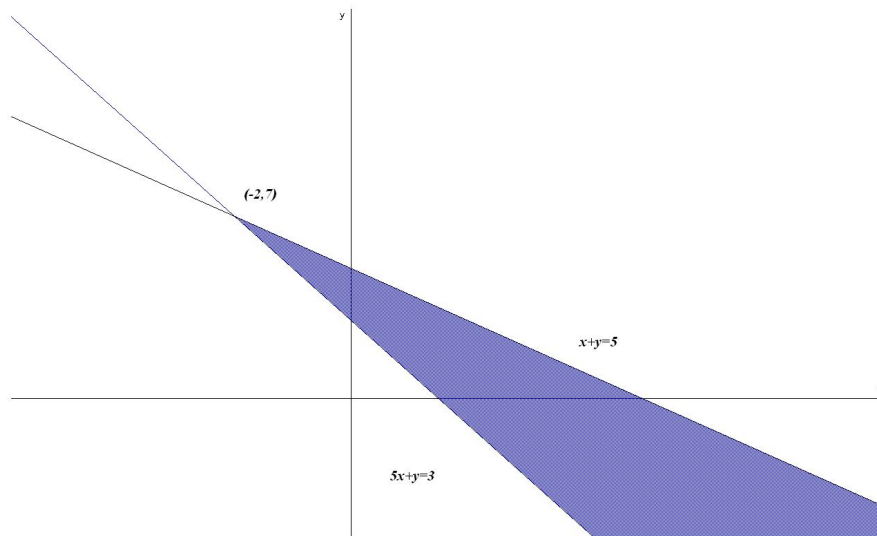
$$\begin{cases} x + y \leq 5 \\ 2x + y \geq 3 \end{cases}$$

Solución:

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

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

$$\begin{cases} x + y = 5 \\ 2x + y = 3 \end{cases} \implies \begin{cases} x = -2 \\ y = 7 \end{cases} \implies (-2, 7)$$



Problema 8

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

Solución:

$$(\sqrt{x+5})^2 = (1 + \sqrt{x})^2 \implies x + 5 = 1 + x + 2\sqrt{x} \implies 2 = \sqrt{x} \implies x = 4$$

Problema 9

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

Solución:

$$\sqrt{x-1} = x - 2 \implies x - 1 = x^2 + 4 - 4x \implies x^2 - 5x + 5 = 0 \implies$$

$$\begin{cases} x = 1,381966 \\ x = 3,61803 \text{ No Vale} \end{cases}$$

Problema 10

$$x^4 - 8x^2 - 9 = 0$$

Solución:

Hacemos $z = x^2 \implies z^2 - 8z - 9 = 0 \implies z = 9$ y $z = -1$.

$$z = 9 = x^2 \implies x = \pm 3$$

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