Examen de Matemáticas 4º de ESO

Noviembre 2009

Resolver las siguientes ecuaciones y sistemas:

Problema 1

$$\log(3x+5) - 2\log x = 1$$

Solución:

$$\log\left(\frac{3x+5}{x^2}\right) = \log 10 \Longrightarrow 10x^2 - 3x - 5 = 0 \Longrightarrow$$

$$\begin{cases} x = 0,8728416147 \\ x = -0,5728416147 \text{ No Vale} \end{cases}$$

Problema 2

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

Solución:

$$\frac{(3^x)^2}{3} + 3 \cdot 3^x - 1 = 0 \Longrightarrow \frac{t^2}{3} + 3t - 1 = 0 \Longrightarrow \begin{cases} t = 0,3218253804 \\ t = -9,321825380 \end{cases}$$

$$\begin{cases} t = 0,3218253804 = 3^x \Longrightarrow x = -1,031980243 \\ t = -9,321825380 = 3^x \Longrightarrow \text{ No Vale} \end{cases}$$

Problema 3

$$\begin{cases} \log(x^2 y) & = 13 \\ \log\left(\dfrac{x}{y}\right) & = 2 \end{cases}$$

Solución:

$$\begin{cases} 2\log x + & \log y = & 13 \\ \log x - & \log y = & 2 \end{cases} \Longrightarrow \begin{cases} 2u + & v = & 13 \\ u - & v = & 2 \end{cases} \Longrightarrow$$

$$\begin{cases} u = \log x = 5 \Longrightarrow x = 10^5 \\ v = \log y = 3 \Longrightarrow y = 10^3 \end{cases}$$

Problema 4

$$\begin{cases} 3^{x-1} + & 2^{y+1} & = 15 \\ 3^x - & 2^y & = 1 \end{cases}$$

Solución:

$$\left\{\begin{array}{rrl} \frac{3^x}{3}+ & 2\cdot 2^y & =15 \\ 3^x- & 2^y & =1 \end{array}\right. \Longrightarrow \left\{\begin{array}{rrl} \frac{u}{3}+ & 2v & =15 \\ u- & v & =1 \end{array}\right. \Longrightarrow$$

$$\left\{\begin{array}{l} u=51/7=2^x \Longrightarrow x=1,806 \\ v=44/7=3^y \Longrightarrow y=2,651 \end{array}\right.$$

Problema 5

$$\frac{x-1}{3}-\frac{x-1}{8}\leq \frac{x}{4}+3$$

Solución:

$$8x-8-3x+3\leq 6x+72 \Longrightarrow -x\leq 77 \Longrightarrow x\geq -77 \Longrightarrow [-77,\infty)$$

Problema 6

$$\frac{x^2+5x-14}{x+3}\leq 0$$

Solución:

$$\frac{x^2+5x-14}{x+3}=\frac{(x-2)(x+7)}{x+3}\leq 0$$

	$(-\infty,-7)$	$(-7,-3)$	$(-3,2)$	$(2,\infty)$
$f(x)$	$-$	$+$	$-$	$+$

La solución es: $(-\infty,-7]\cup(-3,2]$

Problema 7

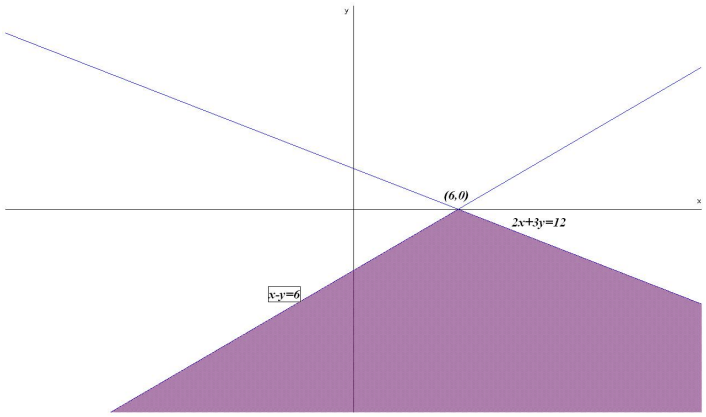
$$\left\{\begin{array}{rrl} 2x+ & 3y & \leq 12 \\ x- & y & \geq 6 \end{array}\right.$$

Solución:

$$2x+3y=12 \Longrightarrow \begin{array}{c|c} x & y \\ \hline 0 & 4 \\ 6 & 0 \end{array}$$

$$x-y=6 \Longrightarrow \begin{array}{c|c} x & y \\ \hline 0 & -6 \\ 6 & 0 \end{array}$$

$$\left\{\begin{array}{rrl} 2x+ & 3y & =12 \\ x- & y & =6 \end{array}\right. \left\{\begin{array}{l} x=6 \\ y=0 \end{array}\right. \Longrightarrow (6,0)$$



Problema 8

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

Solución:

$$(\sqrt{2x-1})^2=(1+\sqrt{x-1})^2 \Longrightarrow 2x-1=1+x-1+2\sqrt{x-1} \Longrightarrow$$

$$x-1=2\sqrt{x-1} \Longrightarrow x=1 \text{ No Vale, } x=5$$

Problema 9

$$12+\sqrt{x-3}=2x$$

Solución:

$$\sqrt{x-3}=2x-12 \Longrightarrow x-3=4x^2+144-48x \Longrightarrow 4x^2-49x+147=0 \Longrightarrow$$

$$\begin{cases} x=7 \\ \\ x=21/4 \text{ No Vale} \end{cases}$$

Problema 10

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

Solución:

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

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

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