Examen de Matemáticas 4º de ESO

Noviembre 2005

Resolver las siguientes ecuaciones y sistemas:

Problema 1

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

Solución:

$$\log\left(\frac{(x-1)^2}{10}\right)=\log x \Longrightarrow x^2-12x+1=0 \Longrightarrow$$

$$\begin{cases} x=11,91607978 \\ x=0,08392021691 \text{ no vale} \end{cases}$$

Problema 2

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

Solución:

$$3\cdot(5^x)^2-5\cdot 5^x-1=0 \Longrightarrow 3t^2-5t-1=0 \Longrightarrow \begin{cases} t=1,847127088 \\ t=-0,1804604217 \end{cases}$$

$$\begin{cases} t=1,847127088=5^x \Longrightarrow x=0,3812706920 \\ t=-0,1804604217=5^x \Longrightarrow \text{ No Vale} \end{cases}$$

Problema 3

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

Solución:

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

$$\begin{cases} u=\log x=3 \Longrightarrow x=1000 \\ v=\log y=0 \Longrightarrow y=1 \end{cases}$$

Problema 4

$$\begin{cases} 2^{x-1}- & 3^{y+1} & =3 \\ 2^x+ & 3^y & =13 \end{cases}$$

Solución:

$$\left\{\begin{array}{rrl} \frac{2^x}{2}- & 3\cdot 3^y & =3 \\ 2^x+ & 3^y & =13 \end{array}\right. \Longrightarrow \left\{\begin{array}{rrl} \frac{u}{2}- & 3v & =3 \\ u+ & v & =13 \end{array}\right. \Longrightarrow$$

$$\left\{\begin{array}{l} u=12=2^x \Longrightarrow x=3,584962500 \\ v=1=3^y \Longrightarrow y=0 \end{array}\right.$$

Problema 5

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

Solución:

$$2x-12\geq 7x+7 \Longrightarrow -5x\geq 19 \Longrightarrow x\leq -\frac{19}{5} \Longrightarrow \left(-\infty,-\frac{19}{5}\right]$$

Problema 6

$$\frac{x^2+x-6}{x+2}\leq 0$$

Solución:

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

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

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

Problema 7

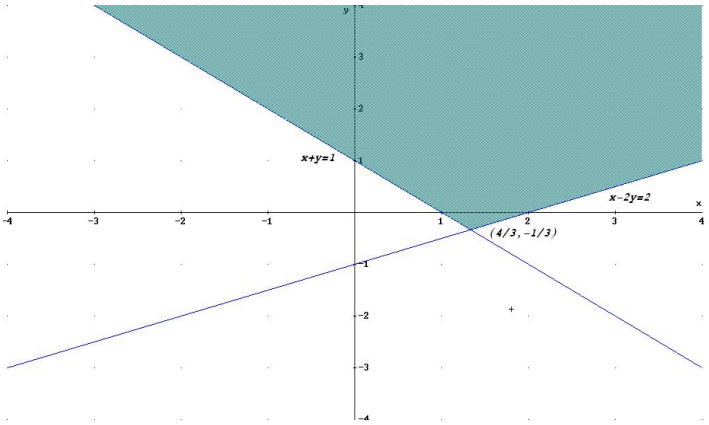
$$\left\{\begin{array}{rrl} x- & 2y & \leq 2 \\ x+ & y & >1 \end{array}\right.$$

Solución:

$$x-2y=2 \Longrightarrow \begin{array}{c|c} x & y \\ \hline 0 & -1 \\ 2 & 0 \end{array}$$

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

$$\left\{\begin{array}{rrl} x- & 2y & =2 \\ x+ & y & =1 \end{array}\right. \Longrightarrow \left\{\begin{array}{l} x=4/3 \\ y=-1/3 \end{array}\right. \Longrightarrow \left(\frac{4}{3},-\frac{1}{3}\right)$$



Problema 8

$$\sqrt{2x+9}=x+3$$

Solución:

$$2x+9=x^2+6x+9 \Longrightarrow x^2+4x=0 \Longrightarrow x=0,\ x=-4, \text{ (no vale)}$$

Problema 9

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

Solución:

$$\sqrt{x-3}=2-\sqrt{x} \Longrightarrow x-3=4+x-4\sqrt{x} \Longrightarrow x=\frac{49}{16}$$

Problema 10

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

Solución:

Hacemos $z=x^2 \Longrightarrow z^2-2z-8=0 \Longrightarrow z=4\ y\ z=-2.$

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

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