# Examen de Matemáticas 4º de ESO

**Noviembre 2009**

Resolver las siguientes ecuaciones y sistemas:

**Problema 1**

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

**Solución:**

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

$$\begin{cases} x = 0,1834935157 \\ x = -0,1634935157 \text{ No Vale} \end{cases}$$

**Problema 2**

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

**Solución:**

$$\frac{(5^x)^2}{5} + 5 \cdot 5^x - 1 = 0 \Longrightarrow \frac{t^2}{5} + 5t - 1 = 0 \Longrightarrow \begin{cases} t = 0,1984250992 \\ t = -25,19842509 \end{cases}$$

$$\begin{cases} t = 0,1984250992 = 5^x \Longrightarrow x = -1,004912070 \\ t = -25,19842509 = 5^x \Longrightarrow \text{ No Vale} \end{cases}$$

**Problema 3**

$$\begin{cases} \log(xy^2) & = 8 \\ \log\left(\dfrac{x^2}{y}\right) & = 1 \end{cases}$$

**Solución:**

$$\begin{cases} \log x + & 2\log y = & 8 \\ 2\log x - & \log y = & 1 \end{cases} \Longrightarrow \begin{cases} u + & 2v = & 8 \\ 2u - & v = & 1 \end{cases} \Longrightarrow$$

$$\begin{cases} u = \log x = 2 \Longrightarrow x = 100 \\ v = \log y = 3 \Longrightarrow y = 1000 \end{cases}$$

**Problema 4**

$$\begin{cases} 2^{x-1} + & 3^{y+1} & = 10 \\ 2^x - & 3^y & = 6 \end{cases}$$

**Solución:**

$$\left\{\begin{array}{lll} \frac{2^x}{2}+ & 3\cdot 3^y & =10 \\ & & \\ 2^x- & 3^y & =3 \end{array}\right. \Longrightarrow \left\{\begin{array}{lll} \frac{u}{2}+ & 3v & =10 \\ & & \\ u- & v & =6 \end{array}\right. \Longrightarrow$$

$$\left\{\begin{array}{l} u=8=2^x \Longrightarrow x=3 \\ \\ v=2=3^y \Longrightarrow y=0,6309297535 \end{array}\right.$$

**Problema 5**

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

**Solución:**

$$5x-12\geq 13-x \Longrightarrow x\geq \frac{25}{6} \Longrightarrow \left[\frac{25}{6},\infty\right)$$

**Problema 6**

$$\frac{x^2+4x-5}{x+2}\geq 0$$

**Solución:**

$$\frac{x^2+4x-5}{x+2}=\frac{(x-1)(x+5)}{x+2}\geq 0$$

| | $(-\infty,-5)$ | $(-5,-2)$ | $(-2,1)$ | $(1,\infty)$ |
|---|---|---|---|---|
| $f(x)$ | $-$ | $+$ | $-$ | $+$ |

La solución es: $[-5,-2)\cup[1,\infty)$

**Problema 7**

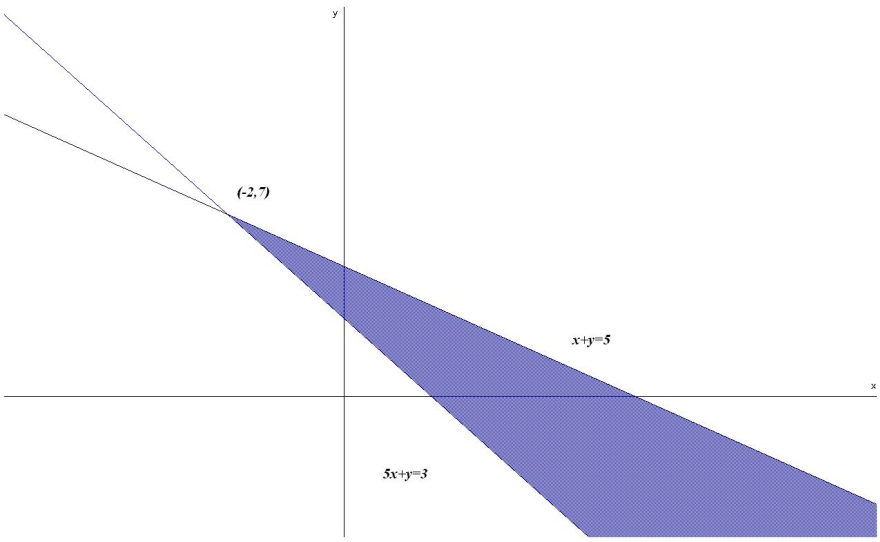
$$\left\{\begin{array}{lll} x+ & y & \leq 5 \\ 2x+ & y & \geq 3 \end{array}\right.$$

**Solución:**

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

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

$$\left\{\begin{array}{lll} x+ & y & =5 \\ 2x+ & y & =3 \end{array}\right. \left\{\begin{array}{l} x=-2 \\ y=7 \end{array}\right. \Longrightarrow (-2,7)$$




**Problema 8**

$$\sqrt{2x+5} - \sqrt{x-1} = 2$$

**Solución:**

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

$$\Longrightarrow x^2 - 12x + 20 = 0 \Longrightarrow \ x = 2, \ \text{ y } \ x = 10$$

**Problema 9**

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

**Solución:**

$$-\sqrt{x-1} = x-3 \Longrightarrow x-1 = x^2+9-6x \Longrightarrow x^2-7x+10 = 0 \Longrightarrow$$

$$\begin{cases} x = 2 \\ \\ x = 5 \ \text{ No Vale} \end{cases}$$

**Problema 10**

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

**Solución:**

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

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

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