

## Examen de Matemáticas 4º de ESO

### Noviembre 2008

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Resolver las siguientes ecuaciones y sistemas:

#### Problema 1

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

**Solución:**

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

$$\begin{cases} x = 0,43166 \\ x = -0,23166 \text{ No Vale} \end{cases}$$

#### Problema 2

$$6^{2x-1} + 6^{x+1} - 1 = 0$$

**Solución:**

$$\frac{(6^x)^2}{6} + 6 \cdot 6^x - 1 = 0 \implies \frac{t^2}{6} + 6t - 1 = 0 \implies \begin{cases} t = 0,027764 \\ t = -36,02776 \end{cases}$$

$$\begin{cases} t = 0,1659021245 = 6^x \implies x = -1,002566084 \\ t = -36,02776 = 6^x \implies \text{No Vale} \end{cases}$$

#### Problema 3

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

**Solución:**

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

$$\begin{cases} u = \log x = 5/3 \implies x = 46,41589 \\ v = \log y = -1/3 \implies y = 0,464159 \end{cases}$$

#### Problema 4

$$\begin{cases} 2^{x-1} + 3^{y+1} &= 5 \\ 2^x - 3^y &= 2 \end{cases}$$

**Solución:**

$$\begin{cases} \frac{2^x}{2} + 3 \cdot 3^y = 5 \\ 2^x - 3^y = 2 \end{cases} \implies \begin{cases} \frac{u}{2} + 3v = 5 \\ u - v = 2 \end{cases} \implies \begin{cases} u = \frac{22}{7} = 2^x \implies x = 1,65208 \\ v = \frac{8}{7} = 3^y \implies y = 0,12154 \end{cases}$$

**Problema 5**

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

**Solución:**

$$8x + 8 - 3x + 3 \leq 6x + 24 \implies -x \leq 13 \implies x \geq -13 \quad [-13, \infty)$$

**Problema 6**

$$\frac{x^2 + 2x - 35}{x + 1} \leq 0$$

**Solución:**

$$\frac{x^2 + 2x - 35}{x + 1} = \frac{(x - 5)(x + 7)}{x + 1} \leq 0$$

|                               | $(-\infty, -7)$ | $(-7, -1)$ | $(-1, 5)$ | $(5, \infty)$ |
|-------------------------------|-----------------|------------|-----------|---------------|
| $x + 7$                       | −               | +          | +         | +             |
| $x + 1$                       | −               | −          | +         | +             |
| $x - 5$                       | −               | −          | −         | +             |
| $\frac{x^2 + 2x - 35}{x + 1}$ | −               | +          | −         | +             |

La solución es:  $(-\infty, -7] \cup (-1, 5]$

**Problema 7**

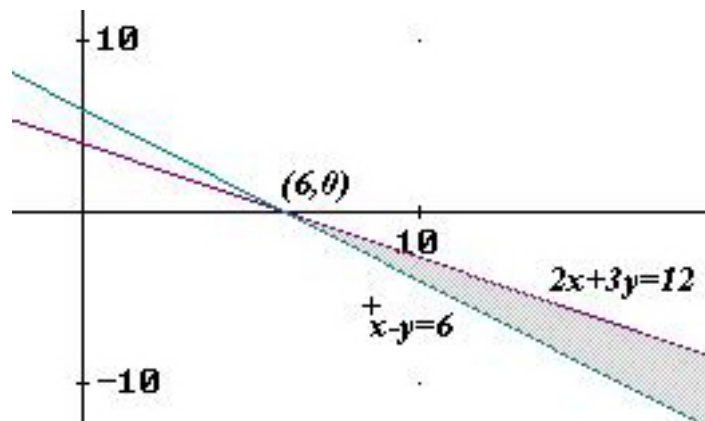
$$\begin{cases} 2x + 3y \leq 12 \\ x - y \geq 6 \end{cases}$$

**Solución:**

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

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

$$\begin{cases} 2x + 3y = 12 \\ x - y = 6 \end{cases} \Rightarrow \begin{cases} x = 6 \\ y = 0 \end{cases} \Rightarrow (6, 0)$$



### Problema 8

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

**Solución:**

$$(\sqrt{2x+1})^2 = (1+\sqrt{x})^2 \Rightarrow 2x+1 = 1+x+2\sqrt{x} \Rightarrow x = 2\sqrt{x} \Rightarrow x = 0 \text{ No Vale, } x = 4$$

### Problema 9

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

**Solución:**

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

$$\begin{cases} x = 5,79129 \\ x = 1,20871 \text{ No Vale} \end{cases}$$

### Problema 10

$$x^4 - 14x^2 - 32 = 0$$

**Solución:**

$$\text{Hacemos } z = x^2 \Rightarrow z^2 - 14z - 32 = 0 \Rightarrow z = 16 \text{ y } z = -2.$$

$$z = 16 = x^2 \Rightarrow x = \pm 4$$

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