Examen de Matemáticas 4º de ESO

Diciembre 2011

Resolver las siguientes ecuaciones y sistemas:

Problema 1

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

Solución:

$$\log\left(\frac{(x+5)^2}{10}\right) = \log(x^2+1) \Longrightarrow 9x^2 - 10x - 15 = 0 \Longrightarrow$$

$$\left\{\begin{array}{l} x = -0,85 \\ x = 1,96 \end{array}\right.$$

Problema 2

$$7^{2x-1} - 7^{x+1} - 3 = 0$$

Solución:

$$\frac{(7^x)^2}{7} - 7 \cdot 7^x - 3 = 0 \Longrightarrow \frac{t^2}{7} - 7t - 3 = 0 \Longrightarrow \left\{\begin{array}{l} t = 49,425 \\ t = -0,425 \end{array}\right.$$

$$\left\{\begin{array}{l} t = 49,425 = 7^x \Longrightarrow x = 2,004 \\ t = -0,425 = 7^x \Longrightarrow \text{ No Vale} \end{array}\right.$$

Problema 3

$$\left\{\begin{array}{rl} \log(x^4 y) & = 9 \\ \log\left(\dfrac{x^2}{y}\right) & = 1 \end{array}\right.$$

Solución:

$$\left\{\begin{array}{rl} \log(x^4 y) & = 9 \\ \log\left(\dfrac{x^2}{y}\right) & = 1 \end{array}\right. \Longrightarrow \left\{\begin{array}{rrl} 4u+ & v = & 9 \\ 2u- & v = & 1 \end{array}\right. \Longrightarrow$$

$$\left\{\begin{array}{l} u = \log x = 5/3 \Longrightarrow x = 10^{5/3} \\ v = \log y = 7/3 \Longrightarrow y = 10^{7/3} \end{array}\right.$$

Problema 4

$$\left\{\begin{array}{rrl} 2^{x+1} - & 3^y & = 6 \\ 2^{x+1} - & 3^{y-1} & = 10 \end{array}\right.$$

Solución:

$$\left\{\begin{array}{rrr} 2\cdot 2^x- & 3^y= & 6 \\ 2\cdot 2^x- & \dfrac{3^y}{3}= & 10 \end{array}\right. \Longrightarrow \left\{\begin{array}{rrr} 2u- & v & =6 \\ 6u- & v & =30 \end{array}\right. \Longrightarrow$$

$$\left\{\begin{array}{l} u=6=2^x \Longrightarrow x=2,585 \\ v=6=3^y \Longrightarrow y=1,631 \end{array}\right.$$

Problema 5

$$\frac{x-1}{6}-\frac{x+1}{12}\leq 1+\frac{3x+1}{2}$$

Solución:

$$x-1\leq 18-18x \Longrightarrow -\frac{21}{7}\leq x \Longrightarrow \left[-\frac{21}{7},\infty\right)$$

Problema 6

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

Solución:

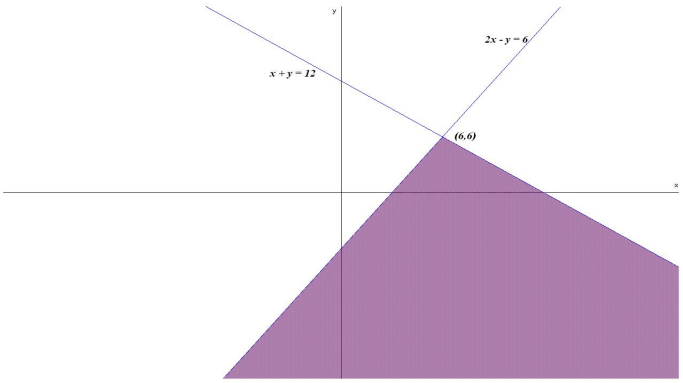
$$\frac{x^2+5x-14}{x-5}=\frac{(x-2)(x+7)}{x-5}\leq 0$$

La solución es: $(-\infty,-7]\cup[2,5)$

Problema 7

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

Solución:



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

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

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

Problema 8

$$\sqrt{8x - 2} = 3$$

Solución:

$$(\sqrt{8x - 2})^2 = 3^2 \Longrightarrow 8x - 2 = 9 \Longrightarrow x = 11/8$$

Problema 9

$$\sqrt{3x + 4} - \sqrt{x + 5} = 1$$

Solución:

$$\sqrt{3x + 4} = 1 + \sqrt{x + 5} \Longrightarrow 3x + 4 = 1 + x + 5 + 2\sqrt{x + 5} \Longrightarrow$$

$$2x - 2 = 2\sqrt{x + 5} \Longrightarrow x^2 - 3x - 4 = 0 \Longrightarrow x = 4,\ x = -1 \text{ no vale}$$

Problema 10

$$x^4 - 6x^2 + 8 = 0$$

Solución:

Hacemos $z = x^2 \Longrightarrow z^2 - 6z + 8 = 0 \Longrightarrow z = 2\ y\ z = 4$.

$$z = 2 = x^2 \Longrightarrow x = \pm\sqrt{2}$$

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