Examen de Matemáticas 4º de ESO

Enero 2007 (Recuperación)

Problema 1 Resolver las ecuaciones:

a) $\log(99+x) - \log x = 2$

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

Solución:

a) $\log \frac{99+x}{x} = \log 100 \Longrightarrow 99 = 99x \Longrightarrow x = 1$

b) $\log\left(\dfrac{2-x}{100}\right) = \log x^2 \Longrightarrow 2-x = 100x^2 \Longrightarrow x = 0,14; \quad x = -0.14$ no vale

Problema 2 Resolver el sistema de ecuaciones logarítmicas:

$$\left\{\begin{array}{ll} \log(x^2y) & = 10 \\ \\ \log\left(\dfrac{x^3}{y}\right) & = 0 \end{array}\right.$$

Solución:

$$\left\{\begin{array}{ll} \log(x^2y) & = 10 \\ \\ \log\left(\dfrac{x^3}{y}\right) & = 0 \end{array}\right. \Longrightarrow \left\{\begin{array}{ll} 2\log x + \log y & = 10 \\ 3\log x - \log y & = 0 \end{array}\right. \Longrightarrow \left\{\begin{array}{ll} 2u + v & = 10 \\ 3u - v & = 0 \end{array}\right.$$

$$\Longrightarrow \left\{\begin{array}{l} u = \log x = 2 \\ v = \log y = 6 \end{array}\right. \Longrightarrow \left\{\begin{array}{l} x = 10^2 \\ y = 10^6 \end{array}\right.$$

Problema 3

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

Solución:

$$2^x - 2 \cdot 2^x + 1 = 0 \Longrightarrow t - 2t + 1 = 0 \Longrightarrow t = 1$$

$$t = 2^x = 1 \Longrightarrow x = 0$$

Problema 4

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

Solución:

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

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

Problema 5

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

Solución:

$$3x+x-1<6-2x-2 \Longrightarrow x<\frac{5}{6} \Longrightarrow \left(-\infty,\frac{5}{6}\right)$$

Problema 6

$$x^2-x-2<0$$

Solución:

$$x^2-x-2=(x-2)(x+1)<0$$

	$(-\infty,-1)$	$(-1,2)$	$(2,\infty)$
$x+1$	$-$	$+$	$+$
$x-2$	$-$	$-$	$+$
x^2-x-2	$+$	$-$	$+$

La solución es: $(-1,2)$

Problema 7

$$\sqrt{2x-1}+x=8$$

Solución:

$$2x-1=64+x^2-16x \Longrightarrow x^2-18x+65=0 \Longrightarrow$$

$$\left\{\begin{array}{l} x=5 \\ x=13 \text{ No Vale} \end{array}\right.$$

Problema 8

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

Solución:

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

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

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