Examen ecuaciones 4º ESO Opción B

①

a) $\sqrt{x^4+9} - \sqrt{6x^2+1} = 0$

$\sqrt{x^4+9} = \sqrt{6x^2+1} \rightarrow x^4+9 = 6x^2+1$

$x^4 - 6x^2 + 9 - 1 = 0 \rightarrow x^4 - 6x^2 + 8 = 0$

C.V. $z = x^2$

$z^2 - 6z + 8 = 0$

$z = \frac{+6 \pm \sqrt{36-4\cdot 8}}{2} = \frac{6 \pm \sqrt{4}}{2} = \frac{6 \pm 2}{2}$ $\begin{cases} \frac{8}{2} = 4 \\ \frac{4}{2} = 2 \end{cases}$

Deshacer el cambio

$\left.\begin{matrix} z = 4 \\ z = x^2 \end{matrix}\right\} \; x^2 = 4 \rightarrow x = \pm 2$

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

Comprobar soluciones

$x = \pm 2$ como son exponente par puedo comprobar los dos a la vez

$\sqrt{z^4+9} - \sqrt{6z^2+1} = 0$

$\sqrt{25} - \sqrt{25} = 0$ ✓

$x = \pm\sqrt{2}$

$\sqrt{(\sqrt{2})^4+9} - \sqrt{6\cdot(\sqrt{2})^2+1} = 0$

$\sqrt{z^2+9} - \sqrt{6\cdot 2+1} = 0$

$\sqrt{13} - \sqrt{13} = 0$ ✓

Soluciones:

$x = \pm 2$

$x = \pm\sqrt{2}$

b) $x + \frac{8}{2x} = 5$

$2x \cdot x + 8 = 5 \cdot 2x$

$2x^2 - 10x + 8 = 0$

$x = \frac{+10 \pm \sqrt{100-64}}{4} = \frac{10 \pm 6}{4} = \begin{cases} \frac{16}{4} = 4 \\ \frac{4}{4} = 1 \end{cases}$

Soluciones

$x = 4$
$x = 1$

c) $4x^4 - 17x^2 + 4 = 0$

C.V. $z = x^2$

$4z^2 - 17z + 4 = 0$

$z = \frac{+17 \pm \sqrt{289-64}}{8} = \frac{17 \pm 15}{8} = \begin{cases} \frac{2}{8} = \frac{1}{4} \\ \frac{32}{8} = 4 \end{cases}$

Deshacer el cambio

$z = x^2$

$\frac{1}{4} = x^2 \rightarrow x = \pm \frac{1}{2}$

$4 = x^2 \rightarrow x = \pm 2$

Soluciones.

d) $2^{2x-1} = 4$

$\frac{2^{2x}}{2} = 4 \rightarrow 2^{2x} = 4 \cdot 2 \rightarrow 2^{2x} = 2^3$

$2x = 3 \rightarrow x = \frac{3}{2}$

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

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

C.V

$z = 2^x$

$2 \cdot z^2 - 3 \cdot z + 1 = 0$

$z = \frac{+3 \pm \sqrt{9-8}}{4} = \frac{3 \pm 1}{4} = \begin{cases} \frac{4}{4} = 1 \\ \frac{2}{4} = \frac{1}{2} \end{cases}$

Deshacer el cambio

$z = 2^x$

$z = 1 \rightarrow 2^x = 1 \quad x = 0$

$z = \frac{1}{2} \rightarrow 2^x = \frac{1}{2} \quad x = -1$

recuerda que $a^{-n} = \frac{1}{a^n} \rightarrow \frac{1}{2} = 2^{-1}$

Soluciones

$x = 0$
$x = -1$

f) $\log x + \log(x+3) = 2\log(x+1)$

$\log[x \cdot (x+3)] = \log(x+1)^2$

$[x \cdot (x+3)] = (x+1)^2$

$x^2 + 3x = x^2 + 2x + 1$

$3x - 2x + 1 = 0$

$x + 1 = 0$

$\boxed{x = -1}$

(2) $6x^4+x^3-11x^2=6x$

$6x^4+x^3-11x^2-6x=0$

$x(6x^3+x^2-11x-6)=0$

$P(1)=6+1-11-6\neq 0$

$P(-1)=-6+1+11-6=0$

	6	1	−11	−6
−1		−6	5	6
	6	−5	−6	0

$6x^2-5x-6=0$

$x=\frac{5\pm\sqrt{25+144}}{12}=\frac{5\pm 13}{12}=\begin{cases}\frac{18}{12}=\frac{3}{2}\\ \frac{-8}{12}=-\frac{2}{3}\end{cases}$

Soluciones

$x=0$

$x=-1$

$x=\frac{3}{2}$

$x=-\frac{2}{3}$

(3)

	Ahora	dos años
Padre	$4x$	$4x+16$
hijo	x	$x+16$

La edad será el doble

$4x+16=2(x+16)$

$4x+16=2x+32$

$2x=16$

$x=\frac{16}{2}=8$

Padre 32
hijo 8