

# 1ª Eval. / Ctrl 2

## ① Descomponer

a)  $2x^3 + 5x^2 - 4x - 3$

$$= \boxed{(x-1)(x+3)(2x+1)}$$

$$\begin{array}{r|rrrr} +1 & 2 & 5 & -4 & -3 \\ & & +2 & 7 & 3 \\ \hline -3 & 2 & 7 & 3 & 0 \\ & & -6 & -3 & \\ \hline & 2 & 1 & 0 & \end{array}$$

b)  $(2x-3)^2 - (x-5)^2 =$

$$= [(2x-3) + (x-5)] \cdot [(2x-3) - (x-5)]$$

$$= \boxed{(3x-8) \cdot (x+2)}$$

c)  $1 - a^2 + 2ax - x^2 = 1 - (a^2 - 2ax + x^2)$

$$= 1^2 - (a-x)^2 = [1 + (a-x)] \cdot [1 - (a-x)] = \boxed{(1+a-x) \cdot (1-a+x)}$$

d)  $x^4 - 12x^3 + 36x^2$

$$= x^2(x^2 - 12x + 36) = x^2 \cdot (x-6)^2$$

## ② Resolver

a)  $2\sqrt{2x-1} = \sqrt{6x-5} + \sqrt{2x-9}$

$$(2\sqrt{2x-1})^2 = (\sqrt{6x-5} + \sqrt{2x-9})^2$$

$$4 \cdot (2x-1) = (6x-5) + (2x-9) + 2\sqrt{(6x-5)(2x-9)}$$

$$8x-4 = 6x-5 + 2x-9 + 2\sqrt{(\quad)(\quad)}$$

$$(10)^2 = (2\sqrt{(\quad)(\quad)})^2$$

$$100 = 4 \cdot (12x^2 - 64x + 45)$$

$$125 = 12x^2 - 64x + 45$$

$$12x^2 - 64x + 20 = 0$$

$$3x^2 - 16x + 5 = 0$$

$$x = \frac{16 \pm \sqrt{(-16)^2 - 4 \cdot 3 \cdot 5}}{6} = \frac{16 \pm \sqrt{256 - 60}}{6} = \begin{cases} \frac{16+14}{6} = \boxed{5} \text{ Si} \\ \frac{16-14}{6} = \boxed{\frac{1}{3}} \text{ No.} \end{cases}$$

$$\begin{array}{r} 6x-5 \\ 2x-9 \\ \hline 12x^2 - 10x \\ -54x + 45 \\ \hline 12x^2 - 64x + 45 \end{array}$$

b)  $\frac{900}{x^2} = 61 - x^2$

$$900 = 61x^2 - x^4$$

$$x^4 - 61x^2 + 900 = 0$$

Cambio  $x^2 = t$

$$t^2 - 61t + 900 = 0$$

$$t = \frac{61 \pm \sqrt{(-61)^2 - 4 \cdot 1 \cdot 900}}{2} = \frac{61 \pm \sqrt{121}}{2} \begin{cases} \frac{61+11}{2} = 36 \\ \frac{61-11}{2} = 25 \end{cases}$$

$$x^2 = 36$$

$$x_1 = +6; x_2 = -6$$

$$x^2 = 25$$

$$x_3 = +5; x_4 = -5$$

$$c) \quad \frac{x+5}{2-x} = \frac{28}{x^2-4} + \frac{5}{x+2}$$

$$(x+5)(x+2) = 28 + 5(x-2)$$

$$x^2 + 2x + 5x + 10 = 28 + 5x - 10$$

$$x^2 - 4 = (x+2)(x-2)$$

$$x+2 = (x+2)$$

$$x-2 = (x-2)$$

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

$$x = \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot (-8)}}{2} = \frac{-2 \pm \sqrt{36}}{2} = \begin{cases} \frac{-2+6}{2} = \boxed{2} \text{ NO} \\ \frac{-2-6}{2} = \boxed{-4} \text{ Si} \end{cases}$$

③ Halla a y b.

$$P(x) = x^3 + ax^2 + bx - 5 \text{ entre } (x+1) \text{ el } r = -22 \quad \boxed{P(a) = r.}$$

$$\text{entre } (x-4) \text{ el } r = 3$$

$$P(-1) = (-1)^3 + a(-1)^2 + b(-1) - 5 = -1 + a - b - 5 = a - b - 6$$

$$\rightarrow a - b - 6 = -22 \rightarrow \boxed{a - b = -16}$$

$$P(4) = 4^3 + a \cdot 4^2 + b \cdot 4 - 5 = 64 + 16a + 4b - 5 = 16a + 4b + 59$$

$$\rightarrow 16a + 4b + 59 = 3 \rightarrow 16a + 4b = -56 \rightarrow \boxed{4a + b = -14}$$

$$\begin{cases} a - b = -16 \\ 4a + b = -14 \end{cases} \quad \left. \begin{array}{l} a = \frac{-30}{5} \\ \boxed{a = -6} \end{array} \right\} \begin{array}{l} a - b = -16 \\ -6 - b = -16 \\ -b = -16 + 6 \\ -b = -10 \\ \boxed{b = 10} \end{array}$$

④ Resolver

$$a) \quad 2 + 3^{x+1} = 3^{-x}$$

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

$$\text{Cambio: } 3^x = t$$

$$2 + 3t = \frac{1}{t}$$

$$2t + 3t^2 = 1$$

$$3t^2 + 2t - 1 = 0$$

$$t = \frac{-2 \pm \sqrt{4 - 4 \cdot 3 \cdot (-1)}}{6}$$

$$t = \frac{-2 \pm \sqrt{16}}{6} = \begin{cases} \frac{-2+4}{6} = \frac{1}{3} \\ \frac{-2-4}{6} = -1 \end{cases}$$

$$\begin{cases} 3^x = \frac{1}{3} \\ \boxed{x = -1} \end{cases} \quad \left\{ \begin{array}{l} 3^x = -1 \\ \text{NO} \end{array} \right.$$

$$b) \quad \log_{\frac{1}{3}} \left( -\frac{1}{x} \right) = 2$$

$$\left( \frac{1}{3} \right)^2 = -\frac{1}{x}$$

$$\frac{1}{9} = -\frac{1}{x}$$

$$\boxed{x = -9}$$

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

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

$$x = (x^2 + 9 - 6x) \cdot 2$$

$$x = 2x^2 + 18 - 12x$$

$$2x^2 - 13x + 18 = 0$$

$$x = \frac{13 \pm \sqrt{(-13)^2 - 4 \cdot 2 \cdot 18}}{4}$$

$$x = \frac{13 \pm \sqrt{25}}{4} = \begin{cases} \frac{13+5}{4} = \frac{18}{4} = \frac{9}{2} \\ \frac{13-5}{4} = 2 \end{cases}$$

$$\boxed{x = \frac{9}{2}} \text{ Si } ; x=2 \text{ NO}$$

$$d) \quad (5^x - 10) \cdot (5^x - 0,04) = 0$$

$$5^x - 10 = 0$$

$$5^x = 10$$

$$\log 5^x = \log 10$$

$$x = \frac{\log 10}{\log 5} = \frac{1}{\log 5}$$

$$\boxed{x \approx 1,4306}$$

$$5^x - 0,04 = 0$$

$$5^x = \frac{4}{100}$$

$$5^x = \frac{1}{25}$$

$$5^x = \frac{1}{5^2}$$

$$\boxed{x = -2}$$

## 5) Efectuar y simplificar

$$a) \frac{1}{x} - \frac{x}{x^2-1} + \frac{2x+1}{x^3-x}$$

$$= \frac{\cancel{x^2-1} - x^2 + 2x+1}{x^3-x} = \frac{2x}{x(x^2-1)} = \boxed{\frac{2}{x^2-1}}$$

$$\begin{array}{l} \text{mcm} \\ x^3-x = x(x^2-1) \\ x^2-1 = (x+1)(x-1) \\ x = x \end{array}$$

$$b) \left( x^2 - x + \frac{1}{x} - \frac{1}{x^2} \right) : \left( x - 1 + \frac{1}{x} \right)$$

$$= \frac{x^4 - x^3 + x - 1}{x^2} : \frac{x^2 - x + 1}{x}$$

$$= \frac{\cancel{x} \cdot (x^4 - x^3 + x - 1)}{x^2 \cdot (x^2 - x + 1)} = \frac{(x-1)(x+1)}{x(x^2 - x + 1)} = \frac{(x-1) \cdot (x+1) \cdot \cancel{(x^2 - x + 1)}}{x(x^2 - x + 1)} = \boxed{\frac{x-1}{x}}$$

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# Resolver

$$\textcircled{1} \quad \sqrt{x+1} - x = \frac{x-7}{4}$$

$$4\sqrt{x+1} - 4x = x-7$$

$$(4\sqrt{x+1})^2 = (5x-7)^2$$

$$16(x+1) = 25x^2 + 49 - 70x$$

$$16x + 16 = 25x^2 + 49 - 70x$$

$$0 = 25x^2 - 86x + 33$$

$$x = \frac{86 \pm \sqrt{(-86)^2 - 4 \cdot 25 \cdot 33}}{50} = \frac{86 \pm \sqrt{4096}}{50}$$

$$x = \frac{86 \pm 64}{50} = \begin{cases} \frac{86+64}{50} = \frac{150}{50} = \boxed{3} \text{ si} \\ \frac{86-64}{50} = \frac{22}{50} = \frac{11}{25} \text{ NO} \end{cases}$$

$$\textcircled{3} \quad \begin{aligned} 10^{2x-1} &= 0,001 \\ 10^{2x-1} &= \frac{1}{1000} \\ 10^{2x-1} &= 10^{-3} \\ 2x-1 &= -3 \\ 2x &= -2 \\ \boxed{x = -1} \end{aligned}$$

$$\textcircled{4} \quad \begin{aligned} 25^x &= 500 \\ \log 25^x &= \log 500 \\ x \log 25 &= \log 500 \\ x &= \frac{\log 500}{\log 25} \\ \boxed{x \approx 1,93} \end{aligned}$$

$$\textcircled{2} \quad \frac{1}{x} - \frac{x+1}{x-1} + \frac{5}{2} = 0$$

$$\text{mcm} = 2x(x-1)$$

$$2(x-1) - 2x(x+1) + 5 \cdot x \cdot (x-1) = 0$$

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

$$3x^2 - 5x - 2 = 0$$

$$x = \frac{5 \pm \sqrt{25 - 4 \cdot 3 \cdot (-2)}}{6} = \frac{5 \pm \sqrt{49}}{6}$$

$$x = \begin{cases} \frac{5+7}{6} = \frac{12}{6} = \boxed{2} \\ \frac{5-7}{6} = -\frac{2}{6} = \boxed{-\frac{1}{3}} \end{cases}$$

$$\textcircled{5} \quad \begin{aligned} 2^{x-1} + 2^{x+3} &= \frac{17}{8} \\ \frac{2^x}{2} + 8 \cdot 2^x &= \frac{17}{8} \\ 2^x \left( \frac{1}{2} + 8 \right) &= \frac{17}{8} \\ 2^x \cdot \left( \frac{17}{2} \right) &= \frac{17}{8} \\ 2^x &= \frac{17}{8} : \frac{17}{2} \\ 2^x &= \frac{2 \cdot 17}{8 \cdot 17} \rightarrow 2^x = \frac{1}{4} \\ \boxed{x = -2} \end{aligned}$$

$$\textcircled{6} \quad \frac{1}{2} \log_2 (3x+3) - \frac{1}{2} \log_2 (2x-3) = \log_2 2$$

$$\log_2 (3x+3) - \log_2 (2x-3) = 2 \log_2 2$$

$$\log_2 \frac{3x+3}{2x-3} = \log_2 2^2$$

$$\frac{3x+3}{2x-3} = 4 \Rightarrow 3x+3 = 8x-12$$

$$5x = 15$$

$$\boxed{x = 3}$$