+

1
353

$P(x) = x^4 - 4x^3 - x^2 + 16x - 12$

"regla de Ruffini" para encontrar las dos primeras raíces:

$$\left.\begin{array}{c|rrrrr} & 1 & -4 & -1 & 16 & -12 \\ 1 & & 1 & -3 & -4 & 12 \\ \hline & 1 & -3 & -4 & 12 & 0 \\ 2 & & 2 & -2 & -12 & \\ \hline & 1 & -1 & -6 & 0 & \end{array}\right\} \text{raíces: } 1 \text{ y } 2 \text{ ; divisores: } x-1 \text{ y } x-2$$

las otras dos, resolviendo la ecuación: $x^2 - x - 6 = 0$; que resultan ser 3 y −2; y los correspondientes divisores: $x-3$ y $x+2$

$\boxed{P(x) = (x-1)(x-2)(x-3)(x+2)}$ [5 p]

para obtener las raíces de Q se resuelve la ecuación: $x^2 - 6x + 8 = 0$, obteniéndose 2 y 4 ; y los divisores $x-2$ y $x-4$

$\boxed{Q(x) = (x-2)(x-4)}$ [2 p]

$\frac{P(x)}{Q(x)} = \frac{(x-1)\cancel{(x-2)}(x-3)(x+2)}{\cancel{(x-2)}(x-4)} = \boxed{\frac{(x-1)(x-3)(x+2)}{x-4}} = \boxed{\frac{x^3 - 2x^2 - 5x + 6}{x-4}}$ [3 p]

Wiris: factorizar$(x^4 - 4x^3 - x^2 + 16x - 12) = (x-3)(x-2)(x-1)(x+2)$

factorizar$(x^2 - 6x + 8) = (x-2)(x-4)$

$\frac{x^4 - 4x^3 - x^2 + 16x - 12}{x^2 - 6x + 8} = \frac{x^3 - 2x^2 - 5x + 6}{x-4}$

+

2
1546

$P(x)$ divisible por $x+1 \Rightarrow P(-1) = 0$

$(-1)^3 - m(-1)^2 + 5(-1) - 2 = 0$

$-1 - m - 5 - 2 = 0$

$\boxed{m = -8}$

+

3
1581

$P(\sqrt{2}) = 1 \neq 0 \Rightarrow$ NO

+

4
1582

raíces: $\boxed{x_1 = \frac{2}{3} , x_2 = -\frac{1}{2}}$ [5 p]

descomposición factorial: $\boxed{2\left(x - \frac{2}{3}\right)\left(x + \frac{1}{2}\right)}$ [5 p]

Wiris

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

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

5
1585

$$3x^3-10x^2-8x\begin{cases}\text{raíces: } \boxed{0,\ 4\ \text{ y }\ -2/3}\ \ [5\text{ p}]\\ \text{descomposición factorial: } \boxed{3x(x-4)\left(x+\frac{2}{3}\right)}\ \ [5\text{ p}]\end{cases}$$

6
1592

$Q(x)=3x^3-11x^2+8x+a$

para que sea divisible por $x-2$ el valor numérico $Q(2)=0$

$Q(2)=3\times 2^3-11\times 2^2+8\times 2+a=-4+a=0\Rightarrow \boxed{a=4}$

7
1593

$a=4$ [4 p]

$P(x)=x(x-3)(x+2)(x-2)$ [2 + 2 + 2 p]

8
2552

$$\left(3x^6-x^4+2x^3+1\right):\left(3x^2+2\right)\begin{cases}\text{cociente: } x^4-x^2+\frac{2}{3}x+\frac{2}{3}\\ \text{resto: } -\frac{4}{3}x-\frac{1}{3}\end{cases}$$

$$\begin{array}{rrrrrr|l}
3x^6 & -x^4 & +2x^3 & & & +1 & 3x^2+2 \\ \cline{7-7}
-3x^6 & -2x^4 & & & & & x^4-x^2+\frac{2}{3}x+\frac{2}{3} \\ \cline{1-6}
 & -3x^4 & +2x^3 & & & +1 & \\
 & +3x^4 & & +2x^2 & & & \\ \cline{2-6}
 & & +2x^3 & +2x^2 & & +1 & \\
 & & -2x^3 & & -\frac{4}{3}x & & \\ \cline{3-6}
 & & & +2x^2 & -\frac{4}{3}x & +1 & \\
 & & & -2x^2 & & -\frac{4}{3} & \\ \cline{4-6}
 & & & & -\frac{4}{3}x & -\frac{1}{3} &
\end{array}$$

9
2694

$4x^4-8x^3+x^2+3x=x\left(4x^3-8x^2+x+3\right)$

$$\begin{array}{r|rrrr}
 & 4 & -8 & 1 & 3 \\
1 & & 4 & -4 & -3 \\ \hline
 & 4 & -4 & -3 & 0
\end{array}\quad [1\text{ p}]$$

$4x^4-8x^3+x^2+3x=x(x-1)\left(4x^2-4x-3\right)$

$4x^2-4x-3=0\,;\ x=\frac{4\pm\sqrt{16+48}}{8}=\frac{4\pm 8}{8}=\begin{cases}-1/2\\ 3/2\end{cases}$ [3 p]

$4x^4-8x^3+x^2+3x=\boxed{4x(x-1)\left(x+\frac{1}{2}\right)\left(x-\frac{3}{2}\right)}$ [6 p]

o, también $\boxed{x(x-1)(2x+1)(2x-3)}$

Wiris: factorizar$\left(4x^4-8x^3+x^2+3x\right)=x(x-1)(2x-3)(2x+1)$

11
4168

El resto es el valor numérico del polinomio en $x = -1$:

$$(-1)^4 - 3(-1)^3 + \frac{1}{2}(-1)^2 = 1 + 3 + \frac{1}{2} = \boxed{\frac{9}{2}}$$

12
4203

±1 , ±2

Wiris: raices$(x^4 - 5x^2 + 4) = \{-2, -1, 1, 2\}$

13
42

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

14
43

$$\left(\frac{x}{y^3}-\frac{1}{y^2}\right)\left(\frac{x-y}{y}+\frac{2x}{x-y}-\frac{x^2}{xy-y^2}\right) = \frac{\cancel{x-y}}{y^3}\cdot\frac{(x-y)^2+2xy-x^2}{y\cancel{(x-y)}} =$$

$$= \frac{\cancel{x^2}\cancel{-2xy}+y^2+\cancel{2xy}\cancel{-x^2}}{y^4} = \boxed{\frac{1}{y^2}}$$

15
44

$$\left[\left(\frac{x}{y}-y\right)\left(\frac{x}{y}+y\right)\right]\left(\frac{x}{x^2-y^4}-\frac{1}{x-y^2}\right) = \left[\frac{x-y^2}{y}\cdot\frac{x+y^2}{y}\right]\frac{x-(x+y^2)}{(x+y^2)(x-y^2)} =$$

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

16
354

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

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

17
355

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

18
1329

$$\left(\frac{3}{x}-\frac{x}{3}\right):\left(\frac{1}{x}+\frac{1}{3}\right) = \frac{9-x^2}{3x}:\frac{3+x}{3x} = \frac{(3+x)(3-x)3x}{(3+x)3x} = \boxed{3-x}$$

19
1331

$$\left[\left(x+\frac{1}{x}\right):\left(x-\frac{1}{x}\right)\right](x-1) = \left[\frac{x^2+1}{x}:\frac{x^2-1}{x}\right](x-1) = \frac{(x^2+1)x}{(x^2-1)x}(x-1) = \frac{(x^2+1)(x-1)}{(x+1)(x-1)} = \boxed{\frac{x^2+1}{x+1}}$$

20
1586

$$\frac{x}{x-2}-\frac{x}{x-1}-\frac{x}{x^2-3x+2} = \frac{x(x-1)-x(x-2)-x}{(x-2)(x-1)} = \frac{x(x-1)-x(x-2)-x}{(x-2)(x-1)} = \frac{0}{(x-2)(x-1)} = \boxed{0}$$

21
1589

$$\frac{1}{x-1}-\frac{2(x+1)}{x^2+2x-3}+\frac{1}{x+3} = \frac{x+3-2(x+1)+(x-1)}{\underbrace{(x-1)(x+3)}_{[2\text{ p}]}} =$$

$$= \frac{x+3-2x-2+x-1}{(x-1)(x+3)} = \frac{0}{(x-1)(x+3)} = \boxed{0}\ \ [8\text{ p}]$$

$(x-1)(x+3) \qquad (x-1)(x+3)$

22
1601

1

23
2732

$3x^4-6x^3+3x^2=3x^2\left(x^2-2x+1\right)=\boxed{3x^2(x-1)^2}$ [2 p]

$x^3-x=x\left(x^2-1\right)=\boxed{x(x+1)(x-1)}$ [2 p]

$\frac{3x^4-6x^3+3x^2}{x^3-x}=\frac{3x^2(x-1)^2}{x(x+1)(x-1)}=\boxed{\frac{3x(x-1)}{x+1}=\frac{3x^2-3x}{x+1}}$ [6 p]

24
2738

$\left(1+\frac{x+1}{x+2}\ \frac{x+3}{x+2}\right):\frac{1}{x+2}=\left(1+\frac{(x+1)(x+3)}{(x+2)^2}\right)(x+2)=x+2+\frac{(x+1)(x+3)}{x+2}=\boxed{\frac{2x^2+8x+7}{x+2}}$