

1.- a) Desarrollar el Binomio de Newton: $(2x^5y^3 - 3y^5x^4)^4 =$

b) Sabiendo que $\log 5 = F$ y que $\log 2 = L$ calcular el valor de:
 $\log_2 32 - \log_8 5$ dejando el resultado en función de F y L

2.- a) Desarrolla el valor de la siguiente expresión: $|3 - x| + |3x + 6| - 2$

b) Calcular x en los siguientes casos:

$$2b1) \log_{\frac{5}{3}} \left(\sqrt{\frac{27}{125}} \right) = x$$

$$2b2) \log_x \left(\frac{2}{5} \right) = -2$$

3.- Resolver por el método de Gauss:
$$\begin{cases} 3x + 4y - 6z = -25 \\ x + 2y - 3z = -11 \\ 5x + 8y - 12z = -47 \end{cases}$$

4.- a) Simplifica la expresión:
$$\frac{\frac{x+y}{x-y} \cdot \frac{x^2+y^2}{x^2-y^2}}{\frac{x^2+y^2}{x-y} \cdot \frac{x-y}{x^2-y^2}} : \frac{(x+y)^2}{(x-y)^2} =$$

b) Opera y simplifica:
$$\frac{1}{\binom{x+3}{2}} \cdot \frac{e^{n+1} \cdot (x+3)!}{e^n \cdot (x+1)!} =$$

$$\textcircled{1} \text{ a) } (2x^5y^3 - 3y^5x^4)^4 = \binom{4}{0}(2x^5y^3)^4 - \binom{4}{1}(2x^5y^3)^3(3y^5x^4) + \binom{4}{2}(2x^5y^3)^2(3y^5x^4)^2 - \binom{4}{3}(2x^5y^3)(3y^5x^4)^3 + \binom{4}{4}(3y^5x^4)^4$$

$$= 2^4 \cdot x^{20} \cdot y^{12} - 4 \cdot 2^3 \cdot x^{15} \cdot y^9 \cdot 3y^5 \cdot x^4 + 6 \cdot 2^2 \cdot x^{10} \cdot y^6 \cdot 3^2 \cdot y^{10} \cdot x^8 - 4 \cdot 2x^5y^3 \cdot 3^3y^{15}x^{12} + 3^4y^{20}x^{16}$$

$$= \boxed{16x^{20}y^{12} - 96x^{19}y^{14} + 216x^{18}y^{16} - 216x^{17}y^{18} + 81x^{16}y^{20}}$$

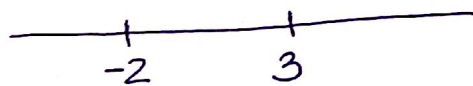
$$\text{b) } \log_5 = F, \log_2 = L$$

$$\log_2 32 - \log_8 5 = \frac{\log 32}{\log 2} - \frac{\log 5}{\log 8} = \frac{\log 2^5}{\log 2} - \frac{\log 5}{\log 2^3} = \frac{5 \log 2}{\log 2} - \frac{\log 5}{3 \log 2} =$$

$$= \boxed{5 - \frac{F}{3L}} = \boxed{\frac{15L - F}{3L}}$$

$$\textcircled{2} \text{ a) } |3-x| + |3x+6| - 2$$

$$|3-x| = \begin{cases} 3-x & \text{si } 3-x \geq 0 \Rightarrow 3 \geq x \Rightarrow x \leq 3 \\ -(3-x) & \text{si } 3-x < 0 \Rightarrow 3 < x \Rightarrow x > 3 \end{cases}$$



$$|3x+6| = \begin{cases} 3x+6 & \text{si } 3x+6 \geq 0 \Rightarrow 3x \geq -6 \Rightarrow x \geq -2 \\ -(3x+6) & \text{si } 3x+6 < 0 \Rightarrow 3x < -6 \Rightarrow x < -2 \end{cases}$$

$$|3-x| + |3x+6| - 2 = \begin{cases} 3-x + (-3x-6) - 2 & \text{si } x < -2 \\ 3-x + 3x+6 - 2 & \text{si } -2 \leq x \leq 3 \\ x-3 + 3x+6 - 2 & \text{si } x > 3 \end{cases} \Rightarrow$$

$$= \begin{cases} -4x-5 & \text{si } x < -2 \\ 2x+7 & \text{si } -2 \leq x \leq 3 \\ 4x+1 & \text{si } x > 3 \end{cases}$$

$$b1) \log_{\frac{5}{3}} \left(\sqrt{\frac{27}{125}} \right) = x \Rightarrow \left(\frac{5}{3} \right)^x = \left(\frac{3^3}{5^3} \right)^{\frac{1}{2}} \Rightarrow \left(\frac{3}{5} \right)^{-x} = \left[\left(\frac{3}{5} \right)^3 \right]^{\frac{1}{2}} \Rightarrow$$

$$\left(\frac{3}{5} \right)^{-x} = \left(\frac{3}{5} \right)^{\frac{3}{2}} \Rightarrow -x = \frac{3}{2} \Rightarrow \boxed{x = -\frac{3}{2}} \quad (\text{no hace falta comprobar})$$

$$b2) \log_x \left(\frac{2}{5} \right) = -2 \Rightarrow x^{-2} = \frac{2}{5} \Rightarrow x^2 = \frac{5}{2} \Rightarrow x = \pm \sqrt{\frac{5}{2}}$$

Si $x = -\sqrt{\frac{5}{2}}$ No es solución, la base $x > 0$

$$\text{Si } \boxed{x = \sqrt{\frac{5}{2}}} \Rightarrow \log_{\sqrt{\frac{5}{2}}} \left(\frac{2}{5} \right) = -2 \Rightarrow \left(\sqrt{\frac{5}{2}} \right)^{-2} = \frac{2}{5} \Rightarrow \left(\frac{5}{2} \right)^{-1} = \frac{2}{5}$$

CIERTO!!

$$\textcircled{3} \begin{cases} 3x + 4y - 6z = -25 \\ x + 2y - 3z = -11 \\ 5x + 8y - 12z = -47 \end{cases} \xrightarrow{E_2 \leftrightarrow E_1} \begin{cases} x + 2y - 3z = -11 \\ 3x + 4y - 6z = -25 \\ 5x + 8y - 12z = -47 \end{cases} \xrightarrow{\begin{matrix} E_2 - 3E_1 \\ E_3 - 5E_1 \end{matrix}} \begin{cases} x + 2y - 3z = -11 \\ -2y + 3z = 8 \\ -2y + 3z = 8 \end{cases}$$

$$\xrightarrow{\begin{matrix} E_3 = E_2 \\ \text{SUPRIMO } E_3 \end{matrix}} \begin{cases} x + 2y - 3z = -11 \\ -2y + 3z = 8 \end{cases} \xrightarrow{z=t} \begin{cases} x + 2y = -11 + 3t \\ -2y = 8 - 3t \Rightarrow y = \frac{8 - 3t}{-2} \Rightarrow \\ \Rightarrow y = \frac{3t - 8}{2} \end{cases}$$

$$x = -11 + 3t - 2 \cdot \left(\frac{3t - 8}{2} \right) = -11 + 3t - 3t + 8 = -3$$

$$\boxed{S: \left(-3, \frac{3t - 8}{2}, t \right) \forall t \in \mathbb{R}}$$

$$\textcircled{4} a) \frac{\frac{x+y}{x-y} \cdot \frac{x^2+y^2}{x^2-y^2}}{\frac{x^2+y^2}{x-y} \cdot \frac{x-y}{x^2-y^2}} \div \frac{(x+y)^2}{(x-y)^2} = \frac{\frac{(x+y)(x^2+y^2)}{(x-y)(x+y)(x-y)}}{\frac{(x^2+y^2) \cdot (x-y)}{(x-y)(x+y)(x-y)}} \div \frac{(x+y)^2}{(x-y)^2} = \frac{x+y}{x-y} \div \frac{(x+y)^2}{(x-y)^2} =$$

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

$$b) \frac{1}{\binom{x+3}{2}} \cdot \frac{e^{n+1} \cdot (x+3)!}{e^n \cdot (x+1)!} = \frac{1}{\frac{(x+3)!}{2! \cdot (x+1)!}} \cdot \frac{e^n \cdot e \cdot (x+3)!}{e^n \cdot (x+1)!} = \frac{2 \cdot (x+1)!}{(x+3)!} \cdot \frac{e(x+3)!}{(x+1)!} = \boxed{2e}$$