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:
$$\frac{\dfrac{x+y}{x-y} \cdot \dfrac{x^2+y^2}{x^2-y^2}}{\dfrac{x^2+y^2}{x-y} \cdot \dfrac{x-y}{x^2-y^2}} : \frac{(x+y)^2}{(x-y)^2} =$$

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

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

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

$+ 3^4 y^{20} x^{16} = \boxed{16x^{20} \cdot y^{12} - 96x^{19} \cdot y^{14} + 216x^{18} \cdot y^{16} - 216x^{17} \cdot y^{18} + 81x^{16} \cdot y^{20}}$

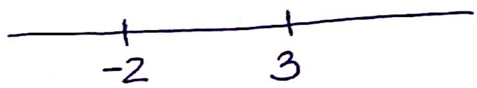
b) $\log 5 = F$, $\log 2 = L$

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

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

2 a) $|3-x| + |3x+6| - 2$

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



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

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

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

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

$\left(\frac{3}{5}\right)^{-x}=\left(\frac{3}{5}\right)^{\frac{3}{2}} \Rightarrow -x=\frac{3}{2} \Rightarrow \boxed{x=-\frac{3}{2}}$ (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 $x>0$

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

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

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

$\Rightarrow y=\frac{3t-8}{2}$

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

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

④ a) $\dfrac{\frac{x+y}{x-y}\cdot\frac{x^2+y^2}{x^2-y^2}}{\frac{x^2+y^2}{x-y}\cdot\frac{x-y}{x^2-y^2}} : \dfrac{(x+y)^2}{(x-y)^2}=\dfrac{\frac{\cancel{(x+y)}\cancel{(x^2+y^2)}}{\cancel{(x-y)}\cancel{(x+y)}(x-y)}}{\frac{\cancel{(x^2+y^2)}\cdot\cancel{(x-y)}}{\cancel{(x-y)}(x+y)\cancel{(x-y)}}} : \dfrac{(x+y)^2}{(x-y)^2}=\dfrac{x+y}{x-y} : \dfrac{(x+y)^2}{(x-y)^2}=$

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

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