Tema 2. 1º Bachillerato A

1. Escribe el desarrollo de $(5x-4y)^9$=

2. Calcula la siguiente división $(3x^5-x^3+4x^2-3x-1)\ :(2x+1)$

3. Resuelve: $\sqrt{2x-1}-\sqrt{2x-4}=3$

4. Resuelve: $\left.\begin{matrix} log\ (x+y)+\log(x-y)=\log 33 \\ 2^x\cdot 2^y=2^{11}\end{matrix}\right\}$

5. Resuelve:
$$\left.\begin{matrix} x+2y-3z=5 \\ 2x-3y+z=3 \\ 4x+y-5z=13\end{matrix}\right\}$$

6. Calcula un polinomio de grado 3 que verifique que 3 es una raíz, (x-1) es un factor, el valor numérico del polinomio para x= 2 es -5 y P(0)= 9

7. Resuelve $9^{1+x}-28\cdot 3^x=0$

8. Resuelve: $\binom{x-4}{x-5}\binom{x+2}{x+1}=0$

9. $\frac{x^2-7x+10}{9-4x^2}\ \geq 0$

10. $\left.\begin{matrix} x+y\geq 0 \\ x\leq 5 \\ 2x-y\geq 2 \\ y>-2\end{matrix}\right\}$

TEMA 2

① $(5x-4y)^9 = \binom{9}{0}(5x)^9(-4y)^0 + \binom{9}{1}(5x)^8(-4y) + \binom{9}{2}(5x)^7(-4y)^2 + \binom{9}{3}(5x)^6(-4y)^3 +$

$+\binom{9}{4}(5x)^5(-4y)^4 + \binom{9}{5}(5x)^4(-4y)^5 + \binom{9}{6}(5x)^3(-4y)^6 + \binom{9}{7}(5x)^2(-4y)^7 +$

$+\binom{9}{8}(5x)(-4y)^8 + \binom{9}{9}(5x)^0(-4y)^9 =$

$= 1953125x^9 - 14062500x^8y + 45000000x^7y^2 - 84000000x^6y^3 +$

$+ 100800000x^5y^4 - 80640000x^4y^5 + 43008000x^3y^6 - 14745600x^2y^7 +$

$+ 2949120xy^8 - 262144y^9$

② $3x^5 \quad -x^3 + 4x^2 - 3x - 1 \quad \underline{| \; 2x-1 \quad}$

$\cancel{-3x^5} - \frac{3}{2}x^4 \qquad \frac{3}{2}x^4 - \frac{3}{4}x^3 - \frac{1}{8}x^2 + \frac{33}{16}x - \frac{81}{32}$

$\cancel{-\frac{3}{2}x^4} - x^3$

$\cancel{+\frac{3}{2}x^4} + \frac{3}{4}x^3$

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

$\cancel{+\frac{1}{4}x^3} + \frac{1}{8}x^2$

$\cancel{\frac{33}{8}x^2} - 3x$

$\cancel{-\frac{33}{8}x^2} - \frac{33}{16}x$

$\cancel{-\frac{81}{16}x} - 1$

$\cancel{\frac{81}{16}x} + \frac{81}{32}$

$\frac{49}{32}$

$C(x) = \frac{3}{2}x^4 - \frac{3}{4}x^3 - \frac{1}{8}x^2 + \frac{33}{16}x - \frac{81}{32}$

$R(x) = \frac{49}{32}$

③ $\sqrt{2x-1} - \sqrt{2x-4} = 3 \Rightarrow (\sqrt{2x-1})^2 = (3+\sqrt{2x-4})^2 \Rightarrow 2x-1 = 9 + 6\sqrt{2x-4} + 2x - 4 \Rightarrow$

$-6 = 6\sqrt{2x-4} \Rightarrow -1 = \sqrt{2x-4} \Rightarrow (-1)^2 = (\sqrt{2x-4})^2 \Rightarrow 1 = 2x-4 \Rightarrow$

$\Rightarrow x = \frac{5}{2}$ Comprobar: $\sqrt{2\cdot\frac{5}{2}-1} - \sqrt{2\cdot\frac{5}{2}-4} = \sqrt{4} - \sqrt{1} = 2-1 \neq 3$ No es solución

④ $\left.\begin{array}{l}\log(x+y) + \log(x-y) = \log 33 \\ 2^x \cdot 2^y = 2^{11}\end{array}\right\}$ $\left.\begin{array}{l}\log[(x+y)(x-y)] = \log 33 \\ 2^{x+y} = 2^{11}\end{array}\right\}$ $\left.\begin{array}{l}(x+y)(x-y) = 33 \\ x+y = 11\end{array}\right\}$

$\left.\begin{array}{l}x^2 - y^2 = 33 \\ x+y = 11\end{array}\right\}$ $x = 11 - y$

$(11-y)^2 - y^2 = 33$

$121 - 22y + \cancel{y^2} - \cancel{y^2} = 33$

$-22y = -88 \Rightarrow y = 4$

$x = 11 - 4 = 7$

Solución $x = 7,\ y = 4 \Rightarrow (7, 4)$

5) $\left.\begin{array}{l} x+2y-3z=5 \\ 2x-3y+z=3 \\ 4x+y-5z=13 \end{array}\right\} \xrightarrow[4E_1-E_3]{2E_1-E_2} \left.\begin{array}{l} x+2y-3z=5 \\ 7y-7z=7 \\ 7y-7z=7 \end{array}\right\} \xrightarrow{E_2-E_3} \left.\begin{array}{l} x+2y-3z=5 \\ 7y-7z=7 \\ 0z=0 \end{array}\right\}$ SCI $z=\lambda$

$$\left(\begin{array}{ccc|c} 1 & 2 & -3 & 5 \\ 2 & -3 & 1 & 3 \\ 4 & 1 & -5 & 13 \end{array}\right) \xrightarrow[4F_1-F_3]{2F_1-F_2} \left(\begin{array}{ccc|c} 1 & 2 & -3 & 5 \\ 0 & 7 & -7 & 7 \\ 0 & 7 & -7 & 7 \end{array}\right) \xrightarrow{E_2-E_3} \left(\begin{array}{ccc|c} 1 & 2 & -3 & 5 \\ 0 & 7 & -7 & 7 \\ 0 & 0 & 0 & 0 \end{array}\right) \quad \text{SCI } z=\lambda$$

$7y-7z=7 \Rightarrow 7y-7\lambda=7 \to y=\frac{7+7\lambda}{7}=1+\lambda$

$x+2y-3z=5 \Rightarrow x+2(1+\lambda)-3\lambda=5 \to x=\lambda+3$

Solución $(\lambda+3,\ 1+\lambda,\ \lambda)\ \forall\lambda\in\mathbb{R}$

6) $P(x)=ax^3+bx^2+cx+d$

3 raíz $\to P(3)=0 \Rightarrow 27a+9b+3c+d=0$

$(x-1)$ factor $\to P(1)=0 \Rightarrow a+b+c+d=0$

$P(2)=-5 \Rightarrow 8a+4b+2c+d=-5$

$P(0)=9 \Rightarrow \boxed{d=9}$

$\left.\begin{array}{l} 27a+9b+3c=-9 \\ a+b+c=-9 \\ 8a+4b+2c=-14 \end{array}\right\}$

$\left.\begin{array}{l} a+b+c=-9 \\ 27a+9b+3c=-9 \\ 8a+4b+2c=-14 \end{array}\right\} \xrightarrow[8E_1-E_3]{27E_1-E_2} \left.\begin{array}{l} a+b+c=-9 \\ 18b+24c=-234 \\ 4b+6c=-58 \end{array}\right\} \xrightarrow{2E_2-9E_3} \begin{array}{l} a+b+c=-9 \\ 18b+24c=-234 \\ -6c=54 \\ \boxed{c=-9} \end{array}$

$18b+24(-9)=-234 \Rightarrow \boxed{b=-1}$

$a-1-9=-9 \Rightarrow \boxed{a=1}$

$P(x)=x^3-x^2-9x+9$

7) $9^{1+x}-28\cdot 3^x=0 \to 9\cdot 9^x-28\cdot 3^x=0 \to 9\cdot(3^2)^x-28\cdot 3^x=0 \to$

$\to 9\cdot(3^x)^2-28\cdot 3^x=0 \underset{3^x=t}{\Longrightarrow} 9t^2-28t=0 \Rightarrow t(9t-28)=0 \to t_1=0$, $t_2=\frac{28}{9}$

$t_1=0=3^x \to \nexists$ Solución

$t_2=\frac{28}{9}=3^x \to \log 3^x=\log\frac{28}{9} \to x\log 3=\log\frac{28}{9} \Rightarrow x=\frac{\log 28/9}{\log 3}=1{,}033$

8) $\binom{x-4}{x-5}\binom{x+2}{x+1}=0$

$$\frac{(x-4)!}{(x-5)!\,(x-4-(x-5))!}\cdot\frac{(x+2)!}{(x+1)!\,(x+2-(x+1))!}=0$$

$$\frac{(x-4)!}{(x-5)!\,1!}\cdot\frac{(x+2)!}{(x+1)!\,1!}=0 \Rightarrow \frac{(x-4)\cancel{(x-5)!}}{\cancel{(x-5)!}}\cdot\frac{(x+2)\cancel{(x+1)!}}{\cancel{(x+1)!}}=0$$

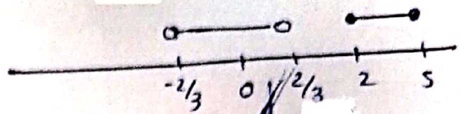
$(x-4)(x+2)=0 \to x=4$, $x=-2$

(9) $\dfrac{x^2-7x+10}{9-4x^2} \geq 0 \longrightarrow \dfrac{(x-2)(x-5)}{(3-2x)(3+2x)} \geq 0$

	$-\infty$ to $-3/2$	$-3/2$ to $3/2$	$3/2$ to 2	2 to 5	5 to $+\infty$
$(x-2)$	$-$	$-$	$-$	$+$	$+$
$(x-5)$	$-$	$-$	$-$	$-$	$+$
$(3-2x)$	$+$	$+$	$-$	$-$	$-$
$(3+2x)$	$-$	$+$	$+$	$+$	$+$
I	$-$	$+$	$-$	$+$	$-$

Solución

$x \in \left(-\frac{3}{2}, \frac{3}{2}\right) \cup [2, 5]$



(10) $x+y \geq 0$

$x \leq 5$

$2x-y \geq 2$

$y > -2$

(1) $x+y=0$

x	0	1
y	0	-1

(3) $2x-y=2$

x	0	1
y	-2	0