$\boxed{E1}$

$$(A|B) = \left(\begin{array}{ccc|c} 1 & 1 & m & 4 \\ 2 & 1 & 0 & 3 \\ 2 & 2 & 2 & 6 \end{array}\right)$$

(a) $|A| = 2+4m-2m-4 = 2m-2$

$|A| = 0 \iff 2m-2=0 \iff \boxed{m=1}$

- Si $m \neq 1 \Rightarrow |A| \neq 0 \rightarrow rg(A)=3$, $rg(A|B)=3$, n^o incog $=3$ $\Big\}$ Th. R-F S.C.D. Solución única.

- Si $m=1$
$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 2 & 1 & 0 & 3 \\ 2 & 2 & 2 & 6 \end{array}\right) \begin{array}{c} F_2-2F_1 \\ F_3-2F_1 \end{array} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & -1 & -2 & -5 \\ 0 & 0 & 0 & 2 \end{array}\right)$$

$rg(A)=2$, $rg(A^*)=3$ $\Big\}$ S.I.

(b) $m=2$
$$\left(\begin{array}{ccc|c} 1 & 1 & 2 & 4 \\ 2 & 1 & 0 & 3 \\ 2 & 2 & 2 & 6 \end{array}\right) \begin{array}{c} F_2-2F_1 \\ F_3-2F_1 \end{array} \left(\begin{array}{ccc|c} 1 & 1 & 2 & 4 \\ 0 & -1 & -4 & -5 \\ 0 & 0 & -2 & -2 \end{array}\right)$$

$$\left.\begin{array}{r} x+y+2z=4 \\ -y-4z=-5 \\ -2z=-2 \end{array}\right\} \rightarrow \boxed{x=+1} \quad \boxed{y=1} \quad \boxed{z=1}$$

E2 $\quad r \equiv \dfrac{x-1}{2} = \dfrac{y-1}{3} = \dfrac{z-1}{2} \qquad A(1,2,1)$

$P(1,1,1)$

$\vec{v}(2,3,2)$

$\overrightarrow{AP} = P - A = (0,-1,0)$

$$\pi \equiv \begin{cases} x = 1 + 2\lambda \\ y = 1 + 3\lambda - \mu \\ z = 1 + 2\lambda \end{cases} \quad \lambda, \mu \in \mathbb{R}$$

$$\pi \equiv \begin{vmatrix} x-1 & y-1 & z-1 \\ 2 & 3 & 2 \\ 0 & -1 & 0 \end{vmatrix} =$$

$$(x-1)2 - (y-1)0 + (z-1)(-2) \Rightarrow$$

$$\boxed{\pi \equiv 2x - 2z = 0}$$

$$\boxed{\pi \equiv x - z = 0}$$

ⓑ

$B(2,1,2)$

$\vec{d}(-1,-3,4)$

$s_1 \equiv \dfrac{x-1}{2} = \dfrac{y-1}{2} = \dfrac{z-1}{2}$

$s_2 \equiv \dfrac{x-2}{-1} = \dfrac{y-1}{3} = \dfrac{z}{2}$

$\vec{v}(2,2,2) \parallel (1,1,1)$

$\vec{w}(-1,3,2)$

$$\vec{d} = \vec{v} \times \vec{w} = \begin{vmatrix} i & j & k \\ 1 & 1 & 1 \end{vmatrix} = (-1,-3,4)$$

$$\vec{d} = \vec{u} \times \vec{w} = \begin{vmatrix} i & j & k \\ 1 & 1 & 1 \\ -1 & 3 & 2 \end{vmatrix} = (-1,-3,4)$$

$$\boxed{r \equiv \begin{cases} x = 2 - \alpha \\ y = 1 - 3\alpha \\ z = 2 + 4\alpha \end{cases}, \ \alpha \in \mathbb{R}}$$

$+16 \ +12 \ -24$

E3 $f(x) = 2x^3 + 3x^2 - 12x$

ⓐ $f'(x) = 6x^2 + 6x - 12$

$f'(x) = 0 \Leftrightarrow \boxed{x = 1} \to f(1) = -7 \quad (1,-7)$

$ \boxed{x = -2} \to f(-2) = 20 \quad (-2,20)$

$$\begin{array}{c|ccccc} f' & + & & - & & + \\ \hline & & -2 & & 1 & \\ & \nearrow & & \searrow & & \nearrow \end{array}$$

Crece: $(-\infty,-2) \cup (1,+\infty)$

Decrece: $(-2,1)$

Máximo: $(-2, 20)$

Mínimo: $(1,-7)$

ⓑ $[-2,2]$

$$\begin{array}{ccc} | & | & | \\ -2 & 1 & 2 \end{array}$$

$16 + 12 - 24$

$f(-2) = 20 \leftarrow$ Máximo absoluto en el intervalo $[-2,2]$ en el punto $(-2,20)$

$f(2) = 4$

$f(1) = -7 \leftarrow$ Mínimo absoluto en el punto $(1,-7)$

mínimo absoluto en el pto $(1,-7)$

$f(1)=-7$

E4

ⓐ $\lim_{x\to 0} \dfrac{\cos x - 1}{x \operatorname{sen} x} = \left[\dfrac{0}{0}\right] \overset{\text{l'hopital}}{=} \lim_{x\to 0} \dfrac{-\operatorname{sen} x}{1 \operatorname{sen} x + x\cos x} =$

$= \left[\dfrac{0}{0}\right] \overset{\text{l'h}}{=} \lim_{x\to 0} \dfrac{-\cos x}{\cos x + \cos x - x \operatorname{sen} x} = \boxed{\dfrac{-1}{2}}$

ⓑ $f(x)=4x \quad [0,2) \quad f \geq g$

$g(x)=x^3 \quad 4x \geq x^3$

$4x - x^3 \geq 0$

$x(4-x^2) \geq 0$

0 + 2

$f-g \geq 0$

$f \geq g$

$x(4-x^2)=0 \to \begin{cases} x=0 \\ x=2 \\ x=-2 \end{cases}$

$A = \int_0^2 (4x - x^3)\,dx = \dfrac{4x^2}{2} - \dfrac{x^4}{4}\Big]_0^2 = 8-4 = \boxed{4\,u^2}$

E5 $n=500 \qquad X \equiv$ "notas..." $\sim N(6'5, 2)$

ⓐ $P(X>8) = P\left(Z > \dfrac{8-6'5}{2}\right) = P(Z > 0'75) =$

$= 1 - P(Z < 0'75) = 1 - 0'7734 = 0'2266$

(b) $P(X<5) = P\left(Z < \frac{5-6'5}{2}\right) = P(Z<-0'75)$

$= 1 - P(Z<0'75) = 0'2266$

$0'2266 \cdot 500 = 113'3$

$\boxed{\text{Approx. } 113}$

E1 $A \begin{pmatrix} k-1 & 2 & -2 \\ 0 & k-2 & 1 \\ 1 & 0 & 1 \end{pmatrix}$

(a) $|A| = (k-1)(k-2) + 2 + 2(k-2) =$

$= k^2 - 3k + \cancel{2} \cancel{+2} + 2k - \cancel{4} = k^2 - k$

$|A| = 0 \Leftrightarrow k(k-1) = 0$ $\left\langle \begin{array}{l} k=0 \\ k=1 \end{array} \right.$

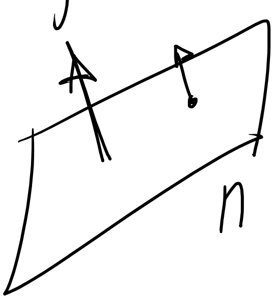
- Invertible si $k \neq 0, 1$

(b) $\boxed{k=2}$ $A \begin{pmatrix} 1 & 2 & -2 \\ 0 & 0 & 1 \\ 1 & 0 & 1 \end{pmatrix}$ $|A| = 2$

$A^{-1} = \frac{1}{|A|} (\text{Adj } A)^t$ $\text{Adj } A = \begin{pmatrix} 0 & 1 & 0 \\ -2 & 3 & 2 \\ 2 & -1 & 0 \end{pmatrix}$

$$\boxed{A^{-1} = \begin{pmatrix} 0 & -1 & 1 \\ 1/2 & 3/2 & -1/2 \\ 0 & 1 & 0 \end{pmatrix}}$$

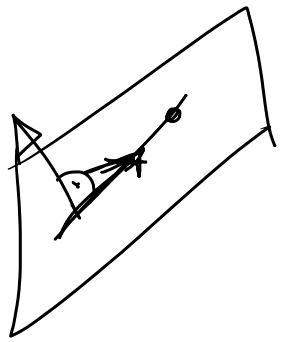
E2 $\quad r \equiv \dfrac{x-1}{m} = \dfrac{y-1}{2} = \dfrac{z-1}{4} \qquad \pi \equiv x+y+kz=0$



(a) $(m,2,4) \parallel (1,1,k)$

$$\frac{m}{1} = \frac{2}{1} = \frac{4}{k}$$

$\boxed{m=2} \quad \boxed{k=2}$



(b) $(m,2,4)\cdot(1,1,k)=0$

$m+2+4k=0 \rightarrow \boxed{m=6}$

$1+1+k=0 \rightarrow \boxed{k=-2}$

E3 $\quad f(x) = ax^3+bx^2+cx+d \qquad f'(x) = 3ax^2+2bx+c$

$f(0)=1 \rightarrow \boxed{d=1}$

$f(1)=0 \rightarrow a+b+c+1=0 \qquad \boxed{b=-1-a}$

$f'(0)=0 \rightarrow \boxed{c=0} \qquad \boxed{b=-3}$

$f'(1)=0 \rightarrow 3a+2b=0$

$f(1) = \ldots \longrightarrow \ldots$

$3a - 2 - 2a = 0 \rightarrow \boxed{a = 2}$

$\boxed{E4}$ $f(x) = \dfrac{2x+3}{x^2+3x+1}$ $[0,2]$

$f(x) = 0 \leftrightarrow 2x+3 = 0 \rightarrow x = -3/2$

$$A = \left| \int_0^2 \frac{2x+3}{x^2+3x+1}\,dx \right| = \ln|x^2+3x+1| \Big]_0^2 =$$

$$= \ln 11 - \ln 1 = \boxed{\ln 11 \ u^2}$$

ⓑ $\lim\limits_{x \to 0} \dfrac{x \sin x}{3\cos x - 3} = \left(\dfrac{0}{0}\right) =$ L'hopital

$$= \lim_{x \to 0} \frac{\sin x + x\cos x}{-3\sin x} = \left(\frac{0}{0}\right) =$$ L'hopital

$$= \lim_{x \to 0} \frac{\cos x + \cos x - x\sin x}{-3\cos x} = \boxed{\frac{2}{-3}}$$

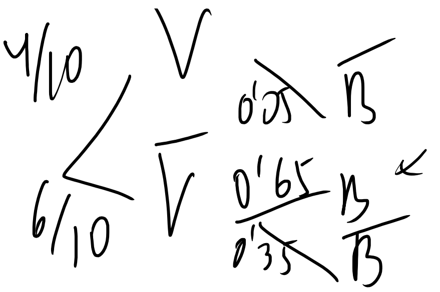
$\boxed{E5}$ V = "tener visor" B = "hacer blanco"

$4/10$, $V \xrightarrow{0'95} B$ *

ⓐ $p = 0'4 \cdot 0'95 + 0'6 \cdot 0'65 = 0'77$

$\ldots \bar{B}$

$0'4935$



ⓐ $p = \ldots$

ⓑ $p(V|B) = \dfrac{0'4 \cdot 0'95}{0'77} = 0'4935$

Es más probable que no !!