OPCION A

Problema 1

a) $|A \cdot C \cdot C^t \cdot A^{-1}| = |A||C||C^t||A^{-1}| = |A^2| = 4(|C| = |C^t||A| \cdot |A^{-1}| = 1)$

b)

$$M = A \cdot B = \begin{pmatrix} 3 & 2 & 2 \\ 1 & 7 & 4 \\ 4 & 5 & 2 \end{pmatrix}\begin{pmatrix} 2 & 1 \\ 5 & 3 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 16 & 11 \\ 37 & 26 \\ 33 & 21 \end{pmatrix}$$

$$No\ tiene\ inversa\ pues\ no\ es\ cuadrada$$

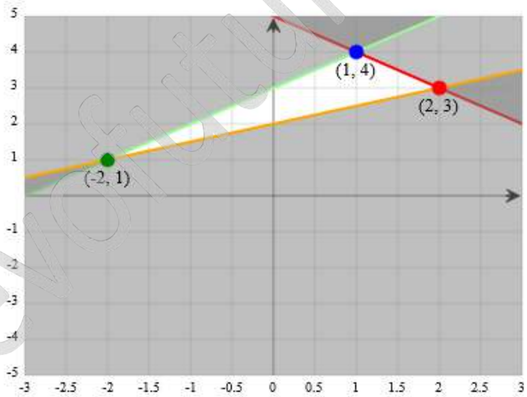
Problema 2

a) *Funcion objetivo f(x,y)=2x+y*

recta verde: y=x+3

recta roja: y=-x+5

recta amarilla y=1/2x+2



Vértice	Rectas tras vértice
● (1, 4)	$x + y = 5$ $x - y = -3$
● (2, 3)	$x + y = 5$ $x - 2y = -4$
● (-2, 1)	$x - y = -3$ $x - 2y = -4$

b) *z=f(-2,1)=-3 Mínimo*

z=f(1,4)=6

z=f(2,3)=7 Máximo

Problema 3

a) $x^3 + 8 = 0 \Rightarrow x = -2\ Luego\ hay\ dos\ áreas\ S_1\ de[-3,-2]\ y\ S_2\ en\ [-2,-1]$

$$S_1 = \int_{-3}^{-2} (x^3 + 8)\, dx = \left[\frac{x^4}{4} + 8x\right]_{-3}^{-2} = -\frac{33}{4}$$

$$S_2 = \int_{-2}^{-1} (x^3 + 8)\, dx = \left[\frac{x^4}{4} + 8x\right]_{-2}^{-1} = \frac{17}{4}$$

$$S = |S_1| + |S_2| = \frac{25}{2} u^2$$

b) $b = f(1) = 9\ f'(x) = 3x^2\ m = f'(1) = 3$

$$y - 9 = 3(x - 1)$$

Problema 4

$$P(H) = 0.55\ P(M) = 0.45\ P(C) = 0.3 P({}^{C}/_{M}) = 0.25$$

a) $P({}^{M}/_{C}) = \frac{P(M)\cdot P({}^{C}/_{M})}{P(C)} = \frac{0.45\cdot 0.25}{0.30} = 0.375$

b) $P(H \cap C) + P(M \cap C) = P(C)$

$$P(H \cap C) = P(C) - P(M \cap C) = P(C) - P({}^{C}/_{M}) \cdot P(M) = 0.3 - 0.25 \cdot 0.45 = 0.1875$$

Problema 5

a) $Z_{\frac{\alpha}{2}} = 1.96\ E = 5$

$$E = Z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}} = 1.96 \frac{50}{\sqrt{n}} = 5 \Rightarrow n > 96.04 \Rightarrow n = 97$$

b) $n = 25\ \mu = 950\ \overline{X} \sim N\left(950, \frac{50}{\sqrt{25}}\right) = N(950,10)$

$$P(\overline{X} \leq 940) = P(Z \leq \frac{940-950}{10}) = P(Z \leq -1) = 1 - P(Z \leq 1) = 1 - 0.8413 = 0.1587$$

OPCION B

Problema 1

a) $A' = \begin{pmatrix} 1 & 2 & 1 & 1 \\ 1 & 2 & 3 & 0 \\ 1 & a & 2 & 0 \end{pmatrix} |A| = -2a + 4 = 0 \Rightarrow a = 2$

$$Si\ a \neq 2\ |A| \neq 0 \Rightarrow rango(A) = 3 = rango(A') = 3 = nº\ de\ incognitas\ \Rightarrow SCD$$

$$Si\ a = 2 A' = \begin{pmatrix} 1 & 2 & 1 & 1 \\ 1 & 2 & 3 & 0 \\ 1 & 2 & 2 & 0 \end{pmatrix} Todos\ los\ menores\ de\ orden\ 3\ son\ 0\ \begin{vmatrix} 2 & 1 \\ 2 & 3 \end{vmatrix} = 4 \neq 0$$
$$\Rightarrow rango(A') = 2 = rango(A) < \ nº\ de\ incognitas\ \Rightarrow SCI$$

b) $Si\ a = 0 \begin{cases} x + 2y + z = 1 \\ x + 2y + 3z = 0 \\ x + 2z = 0 \end{cases} \Rightarrow \begin{cases} x = 1 \\ y = {}^{1}/_{4} \\ z = {}^{-1}/_{2} \end{cases}$

Problema 2

a) $Continuidad\ en\ x = -1$

$$\lim_{x\to -1^-} \frac{-x+b}{x-2} = -\frac{1+b}{3}$$

$$\lim_{x\to -1^+} \frac{x^2+6x+5}{x^2+4x+3} = \left[\frac{0}{0}\right] = L'HOPITAL = \lim_{x\to -1^+} \frac{2x+6}{2x+4} = 2$$

$$-\frac{1+b}{3}=2\Rightarrow b=-7$$

b) *Asíntotas*

Verticales no hay porque $x=2$ *no está en la rama* $x<-1$

Horizontales

$$\lim_{x\to-\infty}\frac{-x+b}{x-2}=-1\ \Rightarrow y=-1$$

$$\lim_{x\to\infty}\frac{x^2+6x+5}{x^2+4x+3}=1\Rightarrow y=1$$

Problema 3

a)

$$f(x)=\int 6x^2+4x-3dx=2x^3+2x^2-2x+C$$

$$f(0)=5\Rightarrow C=5\Rightarrow f(x)=2x^3+2x^2-2x+5$$

b) $f'(x)=6x^2+4x-3=0\Rightarrow x=-1\ x={}^1/_3$

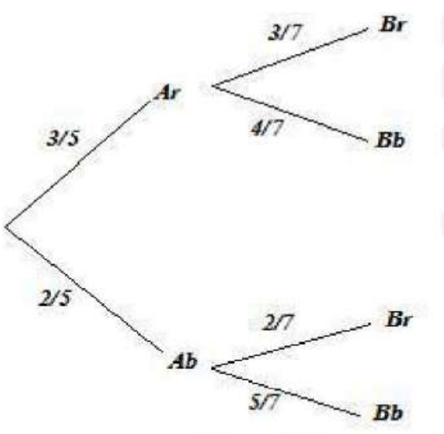
	$(-\infty,-1)$	$(-1,{}^1/_3)$	$({}^1/_3,\infty)$
Signo de $f'(x)$	$+$	$-$	$+$
$f(x)$	*Creciente*	*Decreciente*	*Creciente*

Tiene un mínimo en $({}^1/_3,{}^{125}/_{27})$ *y un máximo en* $(-1,7)$

Problema 4

a) $P(B_r)=\frac{3}{5}\frac{3}{7}+\frac{2}{5}\frac{2}{7}=\frac{13}{35}=0.371$

b)$P(A_b\cap B_b)=\frac{2}{5}\frac{5}{7}=\frac{2}{7}=0.286$



Problema 5

a) $N(\mu, 650) \sigma = 5 \; n = 25 \; Z_{\frac{\alpha}{2}} = 1.96 \; \overline{X} = 70$

$$E = Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}} = 1.96 \frac{5}{\sqrt{25}} = 1.96$$

$$IC = (\overline{X} - E, \overline{X} + E) = (68.04, 71.96)$$

b) $\mu = 70 \; n = 12 \; \frac{855}{12} = 71.25$

$$P(\overline{X} \geq 71.25) = 1 - P(\overline{X} \leq 71.25) = 1 - P\left(Z \leq \frac{71.25 - 70}{5/\sqrt{12}}\right) =$$

$$= 1 - P(Z \leq 0.87) = 1 - 0.8023 = 0.1977$$