A1 $A\begin{pmatrix}2 & 1\\ 1 & 1\end{pmatrix}$ $B\begin{pmatrix}1 & a\\ a & 0\end{pmatrix}$ $C\begin{pmatrix}0 & -1\\ -1 & 2\end{pmatrix}$

(a) $A^{-1}=\frac{1}{|A|}(\text{Adj}\,A)^t$

$|A|=1\neq 0$

$\text{Adj}\,A=\begin{pmatrix}1 & -1\\ -1 & 2\end{pmatrix}$

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

(b) $B+C=A^{-1}$

$$B+C=\begin{pmatrix}1 & a\\ a & 0\end{pmatrix}+\begin{pmatrix}0 & -1\\ -1 & 2\end{pmatrix}=\begin{pmatrix}1 & a-1\\ a-1 & 2\end{pmatrix}$$

$a-1=-1 \longrightarrow \boxed{a=0}$

(c) $A+B+C=3I$

$$A+\overline{B+C}=\begin{pmatrix}2 & 1\\ 1 & 1\end{pmatrix}+\begin{pmatrix}1 & a-1\\ a-1 & 2\end{pmatrix}=\begin{pmatrix}3 & a\\ a & 3\end{pmatrix}$$

$3I=\begin{pmatrix}3 & 0\\ 0 & 3\end{pmatrix} \longrightarrow \boxed{a=0}$

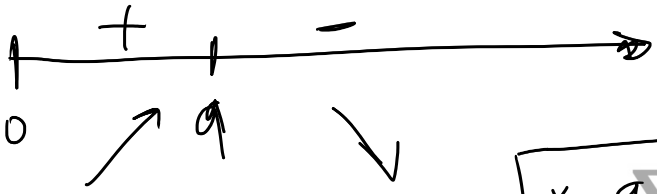
A2

$G(x) = 2x^2+4x+98$

$B(x) = 40x - (2x^2+4x+98) = -2x^2+36x-98$

$B'(x) = -4x+36$

$B'(x) = 0 \Leftrightarrow -4x+36=0 \rightarrow \boxed{x=9}$



$\boxed{x=9 \text{ máximo para } B}$

$\boxed{B(9) = 64 \text{ €}}$

A3

$$f(x) = \begin{cases} x+a, & x<1 \\ x^2-2, & 1 \le x \le 3 \\ x+b, & x>3 \end{cases}$$

$\boxed{x=1}$

$f(1) = -1$

$\lim_{x \to 1^-} x+a = 1+a$

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

$1+a = \underline{-1}$

$\boxed{x=3}$

$f(3) = 7$

$\lim_{x \to 3^-} x^2-2 = 7$

$\lim_{x \to 3^+} x+b = 3+b$

$7 = 3+b$

$1+a=-1$

$\boxed{a=-2}$

$\boxed{b=4}$

(b) $\displaystyle\int_1^3 f(x)\,dx=\int_1^3 (x^2-2)\,dx=F(3)-F(1)=$

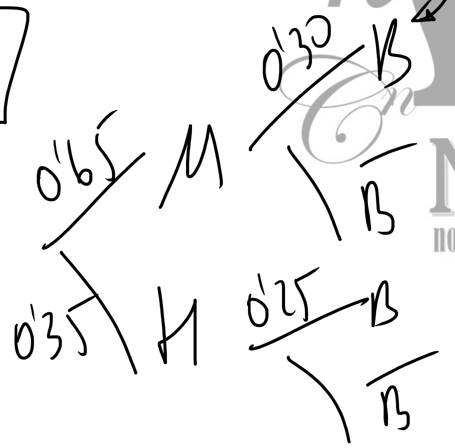
$=3+\frac{5}{3}=\frac{14}{3}$

$F(x)=\int (x^2-2)\,dx=\frac{x^3}{3}-2x$

$F(3)=3$

$F(1)=\frac{1}{3}-2=\frac{-5}{3}$

$\boxed{A4}$



(a) $p(B)=0'65\cdot 0'30+0'35\cdot 0'25=$

$\boxed{=0'2825}$

(b) $p(M|B)=\frac{0'65\cdot 0'30}{0'2825}=\boxed{0'69}$

$\boxed{A5}$ $X\equiv$ "

" $\sim N(\mu, 0'9)$

$n=900$

$\overline{x}=3'5$

$\overline{X}\sim N\left(\mu,\frac{\sigma}{\sqrt{n}}\right)\equiv N\left(\mu,\frac{0'9}{\sqrt{900}}\right)\equiv$

$=N(\mu, 0'03)$

$\overline{X} = 3'5$

$\alpha = 0'05$

$= N(\mu, 0'03)$

$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} = 1'96 \cdot 0'03 = 0'0588$

$P(z \leq z_{\alpha/2}) = 1 - \frac{\alpha}{2}$

$1 - \frac{\alpha}{2} = 1 - \frac{0'05}{2} = 0'975$

$\hookrightarrow z_{\alpha/2} = 1'96$

$IC \left(\overline{X} - E, \overline{X} + E\right) = (3'5 - 0'0588, 3'5 + 0'0588)$

$\boxed{IC = (3'44, 3'56)}$

$\boxed{B1}$

		E	A	H
A	x	15	1'2	8
B	y	12	1	6
			10	120

$$\text{Max } f(x,y) = 15x + 12y$$

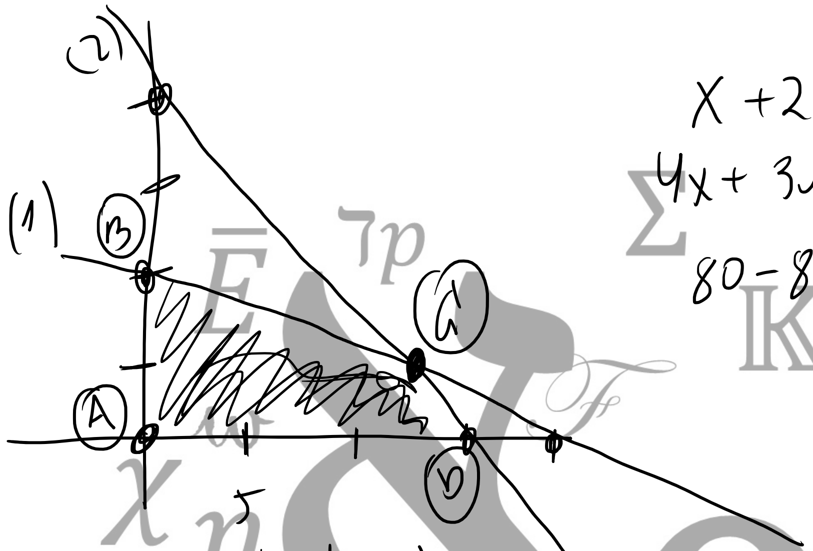
$$\text{s.a } (1)\ \frac{1}{2}x + 1y \le 10 \longrightarrow$$

x	y
0	10
20	0

$$8x + 6y \le 120 \longrightarrow$$

x	y
0	20
15	0

$$x, y \geq 0$$



$$\left.\begin{array}{l} x + 2y = 20 \\ 4x + 3y = 60 \end{array}\right) \quad x = 20 - 2y$$

$$x = 12$$

$$80 - 8y + 3y = 60$$

$$-5y = -20 \rightarrow \boxed{y = 4}$$

	$f(x,y) = 15x + 12y$
A(0,0)	0
B(0,10)	120
C(12,4)	228
D(15,0)	225

Solución: 12 de A, 4 de B

Beneficio 228 €

$\boxed{B2}$ $f(x) = ax^3 + bx \longrightarrow f'(x) = 3ax^2 + b$

a)

$f(1) = 1 \longrightarrow a + b = 1$

$f'(1) = -3 \longrightarrow 3a + b = -3$

$$2a = -4$$

$$a = -2$$

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

$\boxed{a = -2}$

$\boxed{b = 3}$

ⓑ $f(x) = x^3 - 12x \qquad f'(x) = 3x^2 - 12$

$f'(x) = 0 \leftrightarrow 3x^2 - 12 = 0 \rightarrow \boxed{x = \pm 2}$

f'	+		−		+
	$\nearrow$	-2	$\searrow$	2	$\nearrow$

$f(2) = -16$

$f(-2) = 16$

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

Decrece: $(-2, 2)$

Máximo $(-2, 16)$ Mínimo: $(2, -16)$

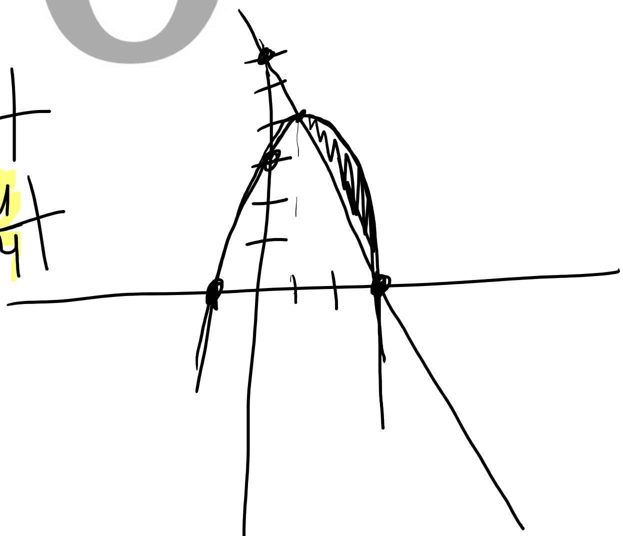
B3

$y = 6 - 2x$

x	0	3	1
y	6	0	4

$y = -x^2 + 2x + 3$

x	0	-1	3	1
y	3	0	0	4



$6 - 2x = -x^2 + 2x + 3$

$-x^2 + 4x - 3 = 0 \quad \begin{cases} x = 1 \\ x = 3 \end{cases}$

$$A = \left| \int_1^3 (-x^2+4x-3)\,dx \right| = |F(3)-F(1)| = \boxed{\frac{4}{3}\,u^2}$$

$$F(x) = -\frac{x^3}{3} + \frac{4x^2}{2} - 3x$$

$$F(3) = -9+18-9 = 0$$

$$F(1) = -\frac{1}{3}+2-3 = -\frac{1}{3}-1 = -\frac{4}{3}$$

$\boxed{B4}$

$p(A) = 0'3$

$p(B) = 0'2$

$p(A|B) = 0'5$

$p(A\cap B)$?

$p(A\cup B)$?

$$p(A|B) = \frac{p(A\cap B)}{p(B)} \to \boxed{p(A\cap B) = 0'2 \cdot 0'5 = 0'1}$$

$$\boxed{p(A\cup B) = p(A)+p(B)-p(A\cap B) = 0'3+0'2-0'1 = 0'4}$$

$\boxed{B5}$ $X \equiv$ " " $\sim N(\mu, 10)$

$E \leq 5$

$$\bar{X} \sim N\left(\mu, \frac{\sigma}{\sqrt{n}}\right) \equiv N\left(\mu, \frac{10}{\sqrt{n}}\right)$$

$E \leq 5$

$\alpha = 0'05$

$\bar{X} \sim N\left(\mu, \frac{\sigma}{\sqrt{n}}\right) \equiv N\left(\mu, \frac{10}{\sqrt{n}}\right)$

$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$

$P(Z \leq z_{\alpha/2}) = 1 - \frac{\alpha}{2}$

$5 = 1'96 \cdot \frac{10}{\sqrt{n}}$

$1 - \frac{0'05}{2} = 0'975$

$\hookrightarrow z_{\alpha/2} = 1'96$

$\sqrt{n} = \frac{1'96 \cdot 10}{5} = 3'92$

$n = 15'36$

$\boxed{n = 16}$