

Ejercicio 1.

$$\left(\begin{array}{ccc|c} 1 & a & 1 & 1 \\ 0 & 2 & a & 2 \\ 1 & 1 & 1 & 1 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & a & 1 & 1 \\ 0 & 2 & a & 2 \\ 0 & a-1 & 0 & 0 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & a & 1 & 1 \\ 0 & 2 & a & 2 \\ 0 & 0 & a(a-1) & 2(a-1) \end{array} \right)$$

- a) Si $a=1$, sistema compatible indeterminado.
 Si $a=0$, sistema incompatible.
 Si $\left. \begin{array}{l} a \neq 1 \\ a \neq 0 \end{array} \right\}$ sistema compatible determinado.

b) Si $a=3$,

$$\left(\begin{array}{ccc|c} 1 & 3 & 1 & 1 \\ 0 & 2 & 3 & 2 \\ 0 & 0 & 6 & 4 \end{array} \right) \Rightarrow \left. \begin{array}{l} x = \frac{1}{3} \\ y = 0 \\ z = \frac{2}{3} \end{array} \right\} \text{solución}$$

Si $a=1$,

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & 2 & 1 & 2 \\ 0 & 0 & 0 & 0 \end{array} \right) \Rightarrow \left. \begin{array}{l} x+y = 1-z \\ 2y = 2-z \end{array} \right\} \Rightarrow \left. \begin{array}{l} x = -\frac{1}{2}z \\ y = 1 - \frac{1}{2}z \end{array} \right\}$$

Solución: $(-\frac{1}{2}\lambda, 1 - \frac{1}{2}\lambda, \lambda)$

Ejercicio 2. $f(x) = \frac{x^2 - x}{x^2 - 3x + 2}$

a) Dom $f = \mathbb{R} - \{1, 2\}$

b) Continua en $\mathbb{R} - \{1, 2\}$. Si $x=1$, $\nexists f(1)$. La discontinuidad

es evitable: $\lim_{x \rightarrow 1} \frac{x^2 - x}{x^2 - 3x + 2} = \lim_{x \rightarrow 1} \frac{x(x-1)}{(x-1)(x-2)} = -1$

$x=2$: $\nexists f(2)$, $\lim_{x \rightarrow 2} f(x) = \infty$: salto infinito

c) Asíntotas verticales: $x=2$

Asíntotas horizontales: $y = \lim_{x \rightarrow \infty} \frac{x^2 - x}{x^2 - 3x + 2} = 1$: $y=1$

Ejercicio 3. $P(A)=0.5, P(B)=0.3, P(C)=0.2$.

$P(\text{cad}|A)=0.01, P(\text{cad}|B)=0.02, P(\text{cad}|C)=0.03$

a) $P(\text{caducado}) = P(A)P(\text{cad}|A) + P(B)P(\text{cad}|B) + P(C)P(\text{cad}|C) = 0.5 \cdot 0.01 + 0.3 \cdot 0.02 + 0.2 \cdot 0.03 = 0.017$

b) $P(B|\text{cad}) = \frac{P(B)P(\text{cad}|B)}{P(\text{cad})} = \frac{0.3 \cdot 0.02}{0.017} = 0.3529$

Ejercicio 4. $\alpha = 0.01, z_{\alpha/2} = 2.575$

a) Intervalo: $(\bar{x} - z_{\alpha/2} \frac{\sigma}{\sqrt{n}}, \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}}) =$

$(1248 - 2.575 \cdot \frac{328}{10}, 1248 + 2.575 \cdot \frac{328}{10}) = (1113.54, 1332.46)$

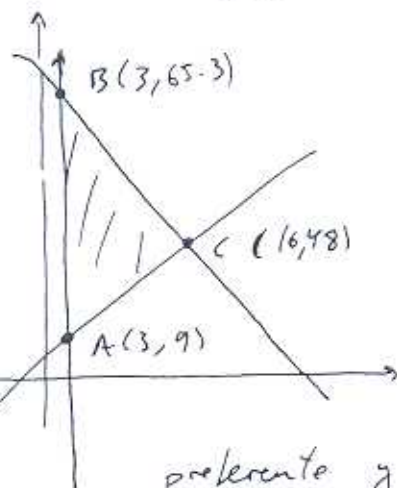
b) $E = z_{\alpha/2} \frac{\sigma}{\sqrt{n}}, 127 = 1.96 \cdot \frac{328}{\sqrt{n}} \Rightarrow \sqrt{n} = \frac{1.96 \cdot 328}{127} \approx 26$

Opción B.

Ejercicio 5. $x = n^{\circ}$ filas clase preferente, $y = n^{\circ}$ filas clase turista

maximizar $Z = 206x + 152y$

s.a. $\left. \begin{aligned} 2x + 1.5y &= 104 \\ x &\geq 3 \\ y &\geq 3x \end{aligned} \right\}$



$Z_A = 1968 \text{ €} = 206 \times 3 + 152 \times 9$

$Z_B = 10592 \text{ €} = 206 \times 16 + 152 \times 48$

$Z_C = 10543.3 \text{ €} = 206 \times 3 + 152 \times 65.3$

El beneficio máximo se obtiene con 16 filas de clase preferente y 48 de clase turista.

Ejercicio 7. $f(x) = ax^3 + bx^2 + c$ Para $p(0,0) \rightarrow c = 0$

Máx. en $(1,2) \Rightarrow$ Para $p(1,2): a + b = 2$
 $\Rightarrow f'(1) = 0; f'(x) = 3ax^2 + 2bx; 3a + 2b = 0$ $\left. \begin{aligned} a + b &= 2 \\ 3a + 2b &= 0 \end{aligned} \right\} \begin{aligned} a &= -4 \\ b &= 6 \end{aligned}$

a) $f(x) = -4x^3 + 6x^2$

b) $A = \int_0^1 (-x^3 + 3x) dx = \left[-\frac{x^4}{4} + \frac{3x^2}{2} \right]_0^1 = -\frac{1}{4} + \frac{3}{2} = \frac{5}{4}$

Ejercicio 3. $P(A \cup B) = 1 - P(\overline{A \cup B}) = 1 - P(\overline{A} \cap \overline{B}) = 1 - \frac{1}{20} = \frac{19}{20}$

$P(A \cup B) = P(A) + P(B) - P(A \cap B) \Rightarrow \frac{19}{20} = \frac{3}{4} + \frac{1}{2} - P(A \cap B) \Rightarrow P(A \cap B) = \frac{3}{10}$

$P(\overline{A} | B) = 1 - P(A | B) = 1 - \frac{P(A \cap B)}{P(B)} = 1 - \frac{3/10}{1/2} = 1 - \frac{3}{20} = \frac{17}{20}$

$P(\overline{B} | A) = 1 - P(B | A) = 1 - \frac{P(A \cap B)}{P(A)} = 1 - \frac{3/10}{3/4} = 1 - \frac{4}{10} = \frac{6}{10} = \frac{3}{5}$

Ejercicio 4 $X =$ tiempo de cenar $\rightarrow N(\mu, \sigma = 32)$

$z_{\alpha/2} \frac{\sigma}{\sqrt{n}} < 10 \quad ; \quad 1.96 \cdot \frac{32}{\sqrt{n}} < 10 \Rightarrow \underline{n = 40}$