Problema 1, 4 ← Contraste paramétrico μ, σ^2

7, 9 ← Proporciones

2b, 4a ← Contraste bilateral (intervalo de confianza)

5, 6 ← Distribuciones NO normales

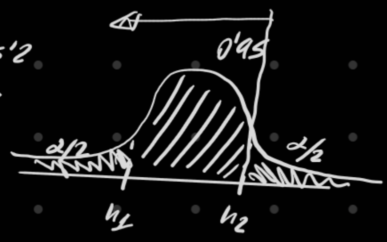
2a, 2c, 7b

11, voluntario f, d

11 - $\quad 5'3 \quad 20'3 \quad 6'4 \quad 10'4 \quad 22'2 \quad 9'7 \quad 14'5 \quad 15'2$

a)

$$\frac{\bar{X}-\mu}{S/\sqrt{n}} \sim t_{n-1} \qquad P(h_1 < t_7 < h_2) = 0'95$$



$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} x_i = \frac{\cdots}{n} = 13 \qquad P(t_7 < h_2) = 0'975 \longrightarrow h_2 = 2'3646$$

$$S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{X})^2 = \frac{1}{7}\left[(5'3-13)^2 + (20'3-13)^2 + \cdots + (15'2-13)^2\right] = 37'93$$

$$\downarrow$$

$$S = 6'1588$$

$$h_1 < \frac{\bar{X}-\mu}{S/\sqrt{n}} < h_2$$

$$h_1 \cdot \frac{S}{\sqrt{n}} < \bar{X} - \mu < h_2 \frac{S}{\sqrt{n}}$$

$$h_1 = -h_2$$

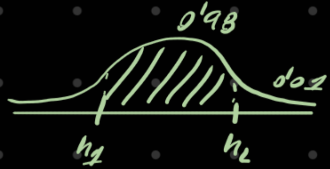
$$-h_2\frac{S}{\sqrt{n}} + \bar{X} < \mu < -h_1\frac{S}{\sqrt{n}} + \bar{X} \implies \mu \in \left(-h_2\frac{S}{\sqrt{n}} + \bar{X},\ -h_1\frac{S}{\sqrt{n}} + \bar{X}\right)$$

cota de error

$$\boxed{\mu \in (7'851,\ 18'149)}$$

No se admite tiempo medio de 20s.

b)



$$P(h_1 < t_{n-1} < h_2) = 0'98$$

$$P(t_{n-1} < h_2) = 0'99 \longrightarrow h_2 = 2'9979$$

$$h_1 = -h_2$$

$$h_1 < \frac{\bar{X}-\mu}{S/\sqrt{n}} < h_2$$

$$-h_2\cdot\frac{S}{\sqrt{n}} + \bar{X} < \mu < -h_1\cdot\frac{S}{\sqrt{n}} + \bar{X} \longrightarrow \boxed{\mu \in (6'472,\ 19'528)}$$

c) $1'96 \cdot \frac{6'1588}{\sqrt{n}} < 1$

$P(Z \le z) = 0'975$

$Z \sim N(0,1)$

Como calculo con que n se cumple lo que se impone

- Se usa una normal porque desconoces n y no puedes usar t_{n-1}

Entrega tema 4

$\mu = E[X] = \frac{2}{3}\theta$ $\quad \sigma^2 = V(x) = 4\theta^2$

$n = 225$ $\quad 1-\alpha = 0'99$

$\bar{X} = 21'3$ $\quad S = 2'5$

a) Por el método de los momentos

$\bar{X} = E[X]$ $\quad S = V(x)$

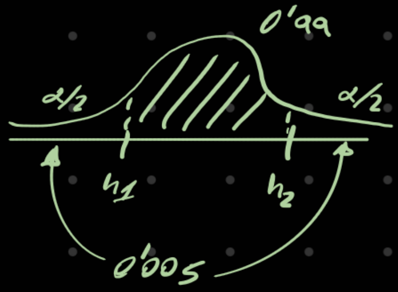
$21'3 = 2/3 \cdot \theta$ $\quad 2'5 = \sqrt{2^2\theta^2}$

$\frac{21'3}{2/3} = \theta$ $\quad 2'5 = 2\theta$

$\frac{2'5}{2} = \theta$

$\boxed{\hat{\theta} = 31'95}$ Muy distinto solo usar uno. $\boxed{\hat{\theta} = 1'25}$

b) $P\left(h_1 < \frac{\bar{X}-\mu}{S/\sqrt{n}} \sim t_{n-1} < h_2\right) = 0'99$



$P(t_{224} < h_2) = 0'995$

$h_2 = 2'5758$

$h_1 = -h_2$

$h_1 < \frac{\bar{X}-\mu}{S/\sqrt{n}} < h_2$

$-h_2 \frac{S}{\sqrt{n}} + \bar{X} < \mu < -h_1 \frac{S}{\sqrt{n}} + \bar{X}$

$\boxed{20'871 < \mu < 21'729}$

Cota error

$-h_2 \frac{S}{\sqrt{n}} < K < -h_1 \frac{S}{\sqrt{n}}$

$\boxed{K \in (\pm 0'4293)}$

No entra 23 en el intervalo, no se admite.

d)

$$h \frac{S}{\sqrt{n}} < 0'25 \longrightarrow \quad n < \left(\frac{2'5758 \cdot 2'5}{0'25}\right)^2 = 663'47$$

$$\boxed{n = 664}$$

e)

$$20'871 < \frac{2\theta}{3} < 21'729$$

$$\boxed{31'307 < \theta < 32'594}$$

f) Los datos no siguen una normal por lo que no se puede hacer un intervalo de confianza para la varianza.

$$\frac{31'307^2}{4} < 4\theta^2 = \sigma^2 < \frac{32'594^2}{4}$$

$$\boxed{245'032 < \sigma^2 < 265'592}$$

Se puede calcular haciendo uso de $4\theta^2 = \sigma^2$

con una confianza del 99%

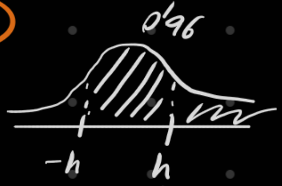
Contrastes $\alpha = 0'04$

$H_0: \mu = 180$

$H_1: \mu > 180$

Los datos evidencian mayor duración

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} x_i = 184$$



$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{X})^2 = 25$$

$$s = \sqrt{25} = 5$$

pivote

$$\alpha = P(\mu > K / H_0 \text{ cierta}) = P\left(t_{n-1} > \frac{\bar{X}-\mu}{s/\sqrt{n}} / \mu = 180\right) =$$

$$P\left(t_8 < \frac{K - 180}{5/\sqrt{9}}\right) = 0'96$$

$$1'8595 < \frac{K-180}{5/\sqrt{9}}$$

Rechaza H_0

$$K > (1'8595 + 180)\, 5/\sqrt{9} \rightarrow \boxed{K < 272'789}$$

$$p\text{-valor} = P(\bar{X} > \bar{x} / \mu = y)$$

$$P(\bar{X} > 184 / \mu = 180)$$

$$P\left(\frac{\bar{X}-\mu}{s/\sqrt{n}} > \frac{184-\mu}{s/\sqrt{n}} / \mu = 180\right)$$

$$P\left(t_8 > \frac{4}{5/\sqrt{9}}\right) = P(t_8 > 2'4) = 1 - 0'98 = 0'02$$

$$\boxed{p\text{-valor} = 0'02 < \alpha = 0'05}$$

Se rechaza H_0

c)

$H_0: \sigma^2 \geq 64$

$H_1: \sigma^2 < 64$

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2 = 25$$

A punto a aceptar H_0

$$\alpha = P(\sigma^2 < K) = 0'04$$

$$P\left(\chi^2_{n-1} < \frac{(n-1)s^2}{\sigma^2}\right) = 0'04$$

$$P\left(\chi^2_8 < \frac{8 \cdot 25}{K^2}\right) = 0'04$$

$$\frac{1}{1'3444} < \frac{K^2}{200}$$

$$\sqrt{\frac{200}{1'3444}} < K \rightarrow \boxed{K > 12'197}$$

Se acepta H_0

$$p\text{-valor} = P(S^2 < s^2 / \sigma^2 = 64)$$

$$P\left(\frac{(n-1)S^2}{\sigma^2} < \frac{(n-1)25}{\sigma^2} / \sigma^2 = 64\right)$$

$$P\left(\chi^2_8 < \frac{200}{64}\right) = P(\chi^2_8 < 3'125) = 0'05$$

$$p\text{-valor} = 0'05 > \alpha = 0'04$$

Se acepta H_0

$P(\text{Rechazar } H_0 / H_0 \text{ cierta})$

$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} x_i = 12$ $\quad s^2 = 9 \longrightarrow s = \sqrt{9} = 3$

$P(\bar{X} > \bar{x} / \mu = 10)$

región crítica

$P(\boxed{\bar{X} > 11} / \mu = 10)$

$\alpha = P\left(t_{15} > \frac{11-10}{3/4}\right) \longrightarrow P(t_{15} \leq 1'\bar{3}) = 1 - 0'9 = 0'1$