S T Q Q S S D

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LISTA 3

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a)

$n = 25$

$\bar{x} = 78,3$

$S = 2$

$\alpha = 1\%$ $\alpha/2 = 0,5\%$

$gl = n-1 = 24$

$\alpha/2 = 0,5\% = 0,005$

$$\bar{x} - t_{\alpha/2} \cdot \frac{S}{\sqrt{n}} \leq \mu \leq \bar{x} + t_{\alpha/2} \cdot \frac{S}{\sqrt{n}}$$

$$78,3 - 2,797 \cdot \frac{2}{5} \leq \mu \leq 78,3 + 2,797 \cdot \frac{2}{5}$$

$$\underline{77,1812 \leq \mu \leq 79,4188}$$

b)

$n = 25$

$\bar{x} = 78,3$

$S = 2$

$gl = 24$

$\alpha = 5\%$

$\alpha/2 = 0,025$

$$\bar{x} - t_{\alpha/2} \cdot \frac{S}{\sqrt{n}} \leq \mu \leq \bar{x} + t_{\alpha/2} \cdot \frac{S}{\sqrt{n}}$$

$$78,3 - 2,064 \cdot \frac{2}{5} \leq \mu \leq 78,3 + 2,064 \cdot \frac{2}{5}$$

$$\underline{77,4744 \leq \mu \leq 79,1256}$$

2

$S = 3$

$\alpha = 5\%$

$\alpha/2 = 0,025$

$gl = V = 18$

$t_{0,025} = 2,101$

$V = 10 + 10 - 2$

$= 18$

$$\bar{X}_1 = \frac{57,9 + 66,2 + 65,4 + 65,2 + 62,6 + 67,6 + 63,7 + 67,2 + 71 + 65,4}{10}$$

$= 65,22$

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$$\bar{X}_2 = \frac{66,4+71,7+70,3+69,3+64,8+69,6+68,6+69,4+65,3+68,1}{10}$$

$$= 68,42$$

$$(\bar{X}_1-\bar{X}_2) - t_{\alpha/2} \cdot S \leq (\mu_1-\mu_2) \leq (\bar{X}_1-\bar{X}_2) + t_{\alpha/2} \cdot S$$

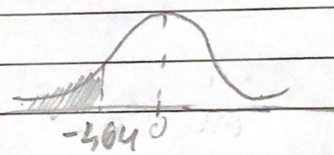
$$(-3,2) - 2,101 \cdot 3 \leq \mu_1-\mu_2 \leq (-3,2) + 2,101 \cdot 3$$

$$-9,503 \leq \mu_1-\mu_2 \leq 3,103$$

(3)

$\sigma = 10$; $\mu = 200$; $\bar{X} = 195$; $n = 100$; $\alpha = 5\%$; $Z_\alpha = 1,64$

$$\begin{cases} H_0: \mu = 200 \\ H_1: \mu < 200 \end{cases}$$



$$Z = \frac{\bar{X}-\mu}{\frac{\sigma}{\sqrt{n}}} = \frac{195-200}{\frac{10}{\sqrt{100}}} = -5$$

$Z_{calc} < Z_{crit}$ → REJEITA A H_0

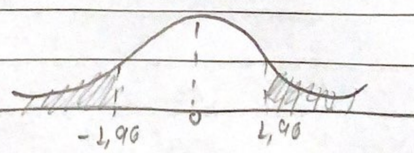
LOGO, A RESISTÊNCIA MÉDIA DIMINUI

(4)

$\mu = 30$; $\sigma = \sqrt{40}$; $\alpha = 5\%$; $Z_{\alpha/2} = 1,96$

$\bar{X} = 31,2004$

$$\begin{cases} H_0: \mu = 30 \\ H_1: \mu \neq 30 \end{cases}$$



$$Z = \frac{\bar{X}-\mu}{\frac{\sigma}{\sqrt{n}}} = \frac{31,2004-30}{\frac{\sqrt{40}}{\sqrt{25}}} \approx 0,949$$

$0 < Z_{cal} < Z_{crit}$, PORTANTO AS CONDIÇÕES SÃO ADEQUADAS → NÃO DESCARTA H_0

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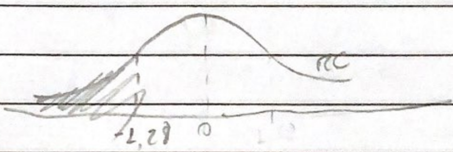
⑤

$\alpha = 10\%$

$$\begin{cases} H_0: p > 0,6 \\ H_1: p < 0,6 \end{cases}$$

$* Z_\alpha = Z_{10\%} = -1,28$　　　$* \hat{p} = \frac{x}{n} = \frac{96}{200} = 0,48$

$$* Z_{cal} = \frac{\hat{p} - p_{H_0}}{\sqrt{\frac{p_{H_0}(1-p_{H_0})}{n}}} = \frac{0,48 - 0,6}{\sqrt{\frac{0,6(1-0,6)}{200}}} \cong -3,4641$$

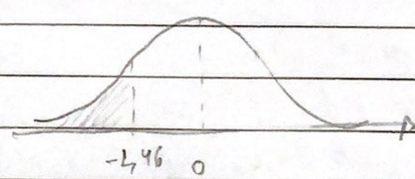


COMO ZCAL PERTENCE À REGIÃO CRÍTICA, DESCARTA-SE H_0 E CONCLUI-SE QUE A AFIRMAÇÃO DO PRODUTOR É FALSA.

⑥

$\mu = 4,5$
$\sigma = 0,5$
$\bar{X} = 4,3$
$\alpha = 5\%$
$n = 49$

$$\begin{cases} H_0: \mu = 4,5 \\ H_1: \mu < 4,5 \end{cases}$$



$Z_\alpha = Z_{5\%} = -1,64$

$$+ Z_{cal} = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{4,3 - 4,5}{\frac{0,5}{\sqrt{49}}} = -2,8$$

COMO $Z_{cal} < Z_\alpha$, ENTÃO DESCARTAMOS H_0 E PODEMOS AFIRMAR QUE A EMPRESA PAGA SALÁRIOS INFERIORES À MÉDIA.

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7

$$\begin{cases} H_0 = \mu_1 = \mu_2 \rightarrow \mu_1 - \mu_2 = 0 \\ H_1 = \mu_1 \neq \mu_2 \rightarrow \mu_1 - \mu_2 \neq 0 \end{cases}$$

$X_1 = 62$
$X_2 = 71$
$n_1 = 50$
$n_2 = 50$
$S_1 = 20$
$S_2 = 20$
$\alpha =$

CONSIDERANDO DUAS POPULAÇÕES COM DISTRIBUIÇÃO NORMAL, INDEPENDENTE E $\alpha = 5\%$, TEMOS

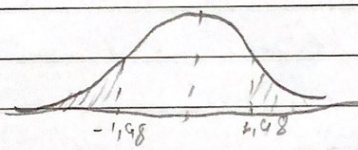
$$S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2}$$

$$= \frac{(50-1)20^2 + (50-1)20^2}{50+50-2} = 400$$

$$* S = \sqrt{S_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)} = \sqrt{400\left(\frac{1}{50} + \frac{1}{50}\right)} = 4$$

$$* v = gl = 50 + 50 - 2 = 98$$

$$* t_{\alpha/2} = t_{0{,}025} = 1{,}98$$



$$* t_0 = \frac{(X_1 - X_2) - \Delta}{S} = \frac{62 - 71 - 0}{4} = -2{,}25$$

$|t_0| > |t_{\alpha/2}|$; LOGO, REJEITA-SE H_0. LOGO HÁ EVIDÊNCIAS PARA ACREDITAR QUE O GASTO MÉDIO NOS DUAS FILIAIS NÃO SÃO O MESMO

INTERVALO DE CONFIANÇA:

$$(X_1 - X_2) - t_{\frac{\alpha}{2}} S \leq \mu_1 - \mu_2 \leq (X_1 - X_2) + t_{\frac{\alpha}{2}} \cdot S$$

$$-16{,}92 < \mu_1 - \mu_2 < -1{,}08$$

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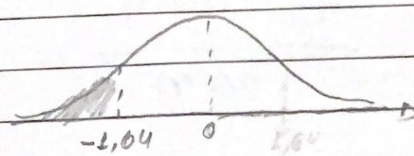
(8)

$n = 25$ | $\begin{cases} H_0: \mu = 8 \\ H_1: \mu < 8 \end{cases}$

$\bar{x} = 7{,}2$

$\sigma = 2$

$\alpha = 5\%$ | $Z_{5\%} = Z_{0{,}05} = -1{,}64$



$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{7{,}2 - 8}{\frac{2}{\sqrt{25}}} = -2$$

-2 pertence à região crítica, logo rejeita-se H_0 e conclui-se que o produto deve ser retirado da linha de produção.

(9)

a)

$\begin{cases} H_0 = \mu_1 = \mu_2 = \mu_3 \\ H_1 = \exists \text{ média diferente} \end{cases}$

b)

$$X_A = \frac{33+38+36+40+31+35}{6} = 35{,}5$$

$$X_B = \frac{32+40+42+38+30+34}{6} = 36$$

$$X_C = \frac{31+37+35+33+34+30}{6} = 33{,}3$$

$$X_D = \frac{28+34+32+30+33+31}{6} = 31{,}3$$

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c) $\bar{\bar{x}} = \dfrac{\sum_{i=1}^{n}\sum_{j=1}^{m} x_{ij}}{m\,n}$ =

$\bar{\bar{x}} = \dfrac{33+38+36+40+31+35+32+40+42+38+30+34+31+37+35+33+34+30+28+34+32+30+33+31}{4 \cdot 6}$

$= 34$

d) SQTn

$SQtn = n \sum_{j=1}^{m} (x_j - \bar{\bar{x}})^2$

$= 6\left[(35{,}5-34)^2+(36-34)^2+(33{,}3-34)^2+(31{,}3-34)^2\right]$

$= 84{,}18$

$gl = m-1 = 4-1 = 3$ $QM_{trat} = \dfrac{84{,}18}{3} = 28{,}06$

e) SQEn

$SQEn = \sum_{i=1}^{n}\sum_{j=1}^{m}(x_{ij} - \bar{x}_j)^2$

$= (33-35{,}5)^2+(38-35{,}5)^2+(36-35{,}5)^2+(40-35{,}5)^2+(31-35{,}5)^2+(35-35{,}5)^2$
$+ (32-36)^2+(40-36)^2+(42-36)^2+(38-36)^2+(30-36)^2+(34-36)^2$
$+ (31-33{,}3)^2+(37-33{,}3)^2+(35-33{,}3)^2+(33-33{,}3)^2+(34-33{,}3)^2+(30-33{,}3)^2$
$+ (28-31{,}3)^2+(34-31{,}3)^2+(32-31{,}3)^2+(30-31{,}3)^2+(33-31{,}3)^2+(31-31{,}3)^2$

$= 53{,}5 + 112 + 12{,}54 + 23{,}34$

$= 201{,}38$

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$gl = m(n-1)$

$= 4(6-1)$

$= 20$

$Q_{\text{medio}} = \frac{201,38}{20} = 10,069$

f) STQ

$STQ = SQ_{Trat} + SQ_{Res}$

$= 84,18 + 201,38$

$= 285,56$

$gl = gl_{trat} + gl_{res}$

$= 3 + 20$

$= 23$

g)

$F = \frac{Q_{Mtrat}}{Q_{Mres}} = \frac{28,06}{10,069} = 2,78$

$F_{TAB} = F_{0,05;3;20} = 3,10$

h) $F_{calc} < F_{TAB} \rightarrow$ NÃO REJEITA H_0, OU SEJA, NÃO EXISTE MÉDIAS DIFERENTES

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