9.1 $X \sim N(34, 36)$ X - "va desgaste" horas

$$\begin{cases} n = 14 \\ \bar{x}_0 = 32{,}8 \end{cases}$$

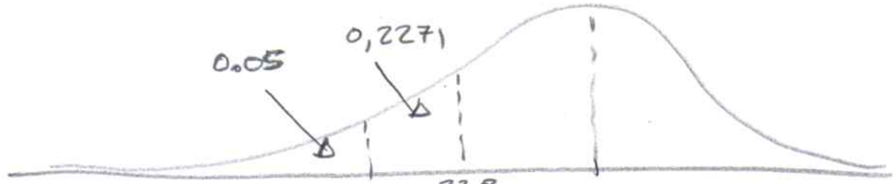
a)

H_0: $\mu = 34$

H_1: $\mu < 34$

$\bar{X}_{H_0} = \frac{1}{14} \sum_{i=1}^{n} X_i \sim N\left(34, \frac{36}{14}\right)$ $\quad$ $2{,}571$

$\alpha = 0.05$



X $\quad$ 31,36 $\quad$ 32,8 $\quad$ 34

Z $\quad$ −1,644 $\quad$ −0,7483 $\quad$ 0

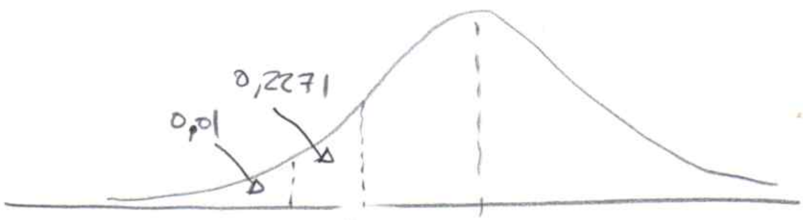
Δ=2,637

RC_x]−∞, 31,36]

RC_Z]−∞, −1,644]

0,2271 > 0.05

b)



X_{H_0} $\quad$ 30,26 $\quad$ 34

Δ = 3,7304

X_0 $\quad$ 32,8

Z $\quad$ −2,326 $\quad$ 0

Z_0 $\quad$ −0,7483

RC_x]−∞, 30,26]

RC_Z]−∞, −2,326]

0,2271 > 0.01

$$P(\bar{X}_{H_0} > 32{,}8) = 0.05$$

$$\Phi\left(\frac{32{,}8-34}{\frac{\sqrt{36}}{\sqrt{n}}}\right) = 0.05$$

$$\frac{32{,}8-34}{\frac{\sqrt{36}}{\sqrt{n}}} = \Phi^{-1}(0.05)$$

$$= 1.645$$

$$\sqrt{n} = \frac{\sqrt{36}}{\frac{-1{,}2}{1.645}}$$

$$n = 67{,}65 \cong 68$$

9.2

$X_i \sim N(68, 32)$

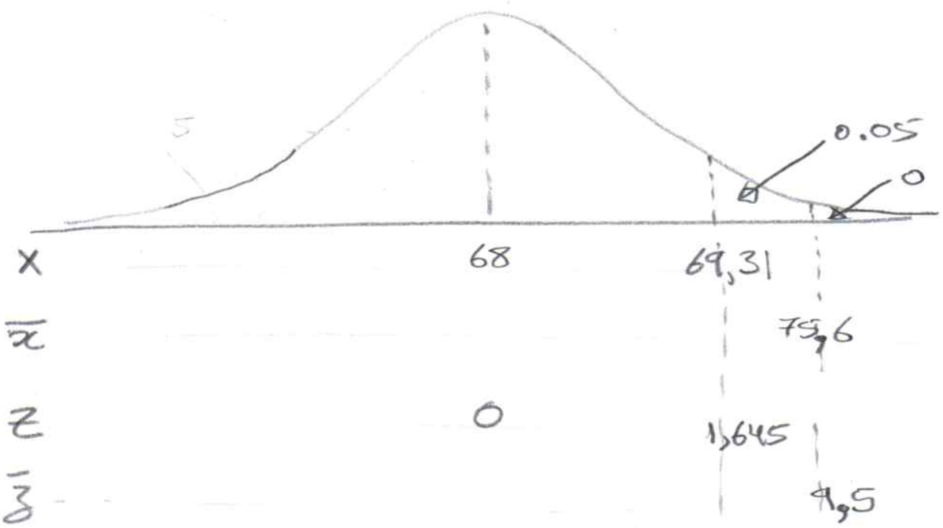
$\begin{cases} n = 50 \\ \bar{x}_0 = 75{,}6 \end{cases}$ $\alpha = 0.05$

$H_0: \mu = 68$

$H_1: \mu > 68$

$X_{H_0} = \frac{1}{50}\sum_{i=1}^{50} x_i \sim N\left(68, \frac{32}{50}\right)$ $\quad \frac{32}{50} = 0{,}64$

$\alpha = 0.05$



$P(RH_0 \mid H_0 V) = P(X_{H_0} > C) = 0.05$

$RC_x \; [69{,}31, +\infty[$

sim deve-se considerar $\bar{x}_0$ uma nova hipotese da média.

$\underline{75{,}6 \in RC}$

9.4) $\hat{p}$ - "proporção de defeituosos os produtos"

a) $\begin{cases} n = 300 \\ \hat{p}_0 = ? \end{cases}$

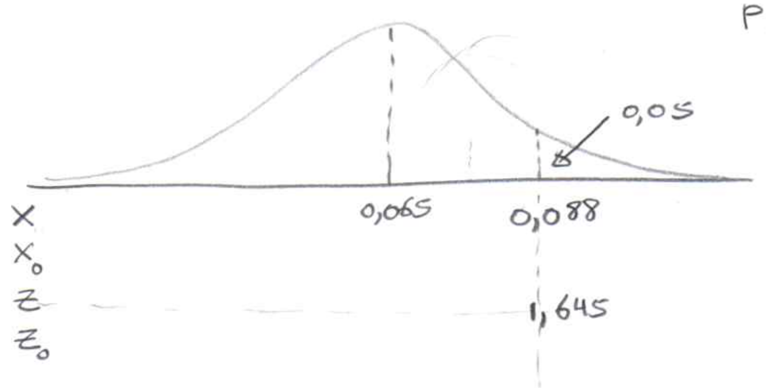
$H_0 : \hat{p} = 0{,}065$

$H_1 : \hat{p} > 0{,}065$

$\hat{p}_{H_0} = \frac{X}{n} \sim N\left(0{,}065, \frac{pq}{300}\right)$

$\alpha = 0.05$

$p \times q = 0{,}060775$



RC_X $[0{,}0884, +\infty[$

Rejeita-se acima de 0,0884 e aceita-se abaixo desse valor.

b) X MV

$P(\bar{X} \geq 0{,}81) = 0{,}1304$

c) $P(\bar{X}_{H_0} > 0.075) = 0.05$

$1 - P(\bar{X}_{H_0} < 0.075) = 0.05$ [XMP]

$P(\bar{X}_{H_0} < 0.075) = 0.95$

$\delta^2 = 3.696 \cdot 10^{-5} = \frac{pq}{n} \Rightarrow n = 1644.$

$\frac{0.075 - 0.065}{\delta} = 1.645$

$\delta^2 = (6.079 \cdot 10^{-3})^2 = \frac{pq}{n}$

d) $\hat{p} = 0.071$

$$\beta = P(A\,H_0 \mid H_0 F) = P(X_{H_1} < 0.884)$$

$$= 0.889$$

$$1-\beta = P(R\,H_0 \mid H_0 F)$$

$$\alpha = P(R\,H_0 \mid H_0 V)$$

9.5)

$\hat{P}_N$ "v.a proporção reprovações a matemáticas a nivel nacional"

$\hat{P}_i$ "v.a proporção isep ano 98/99 matemática"

$$\begin{cases} \hat{P}_N = 0,36 \\ \sigma^2 \cong s^2 \end{cases}$$

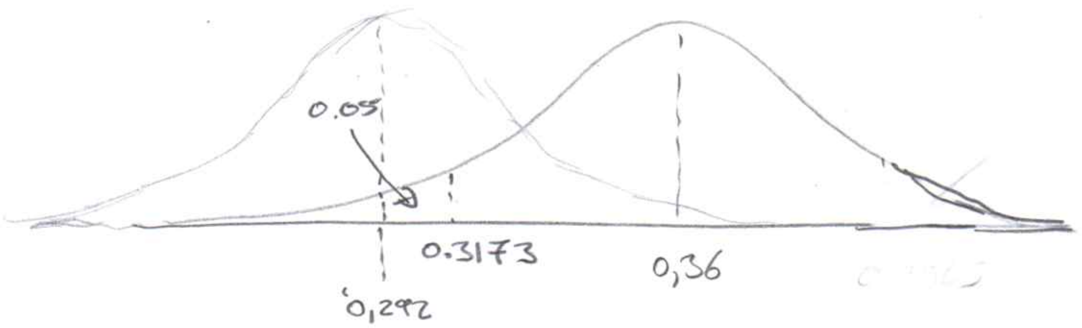
$$\begin{cases} \hat{P}_i = \frac{(1-218)}{308} = 0.292 \\ n = 308 \\ \hat{P}_{0,9_i} = 0.2059 \end{cases}$$

a)

$H_0 : \hat{p} = 0,36$

$H_1 : \hat{p} < 0,36$

$$\hat{P}_{H_0} = \frac{X}{n} \sim N\left(0,36, \frac{0,2067}{308}\right)$$



$RC_X\ [0,4025, +\infty[$

$0.71 \in RC$ sim é melhor.

b)

$$3,24 \times 10^{-4} = \frac{0,2067}{n} \cong 638$$

$$2.34 \times 10^{-3} = \frac{0,2067}{n}$$

$n = 88,25.$

$$P(X_{H_0} < 0.292) = 0.08$$

$\sigma = 0.0483$

$\sigma^2 = 2.3421 \times 10^{-3}$

$$2.3421 \times 10^{-3} = \frac{0.2067}{n}$$

$n \cong 88,25$

9.6

X_{MP_i} – " peso mulheres " "

X_{HP_i} – " " homens " "

$X_{HP_i} \sim N(71.1, 106.23)$; $n_H = 338$

$X_{MP_i} \sim N(57.4, 81.61)$; $n_M = 483$

$X_{D_i} \sim N(19.2, 15.10)$; $n_D = 84$

$X_{ND_i} \sim N(19, 17.07)$; $n_{ND} = 385$

a)

$$\overline{X}_{Hp} = \frac{1}{338}\sum_{i=1}^{338} X_{Hpi} \sim N\left(\mu_H, \frac{106.23}{338}\right)$$

$$\overline{X}_{Mp} = \frac{1}{483}\sum_{i=1}^{483} X_{Mpi} \sim N\left(\mu_M, \frac{81.61}{483}\right)$$

$$\overline{Y}_p = \overline{X}_{Hp} - \overline{X} \sim N\left(\mu, \frac{106.23}{338} + \frac{81.61}{483}\right)$$

$\overline{x}_{Hp_0} = 71.1$

$\overline{x}_{Mp_0} = 57.4$

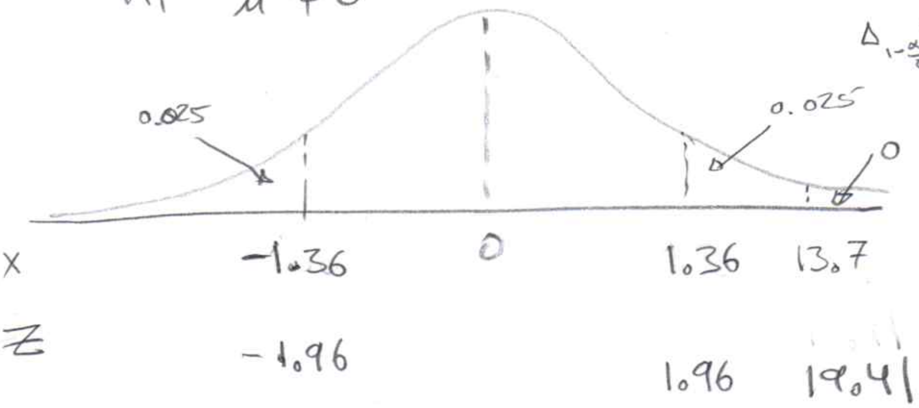
$\overline{Y}_0 = 13.7$

$H_0: \mu = 0$

$H_1: \mu \neq 0$

$$\overline{Y}_{H_0} \sim N\left(0, \underbrace{\frac{106.23}{338} + \frac{81.61}{483}}_{0.48325}\right)$$

$\Delta_{1-\frac{\alpha}{2}} = 1.3625$



RC_X $]-\infty, 1.36] \cup [1.36, +\infty[$

RC_Y $]-\infty, -1.96]$ $[1.96, +\infty[$

$Z_0 = 19.41 \in RC$

9.77)

$H \begin{cases} n = 36 \\ s^2 = 4,28 \\ \bar{x}_H = 18.85 \end{cases}$ $M \begin{cases} n = 40 \\ s^2 = 7.19 \\ \bar{x}_M = 18.68 \end{cases}$

a) $IC_{98\%} = [\bar{x}_0 - \Delta ; \bar{x}_0 + \Delta]$

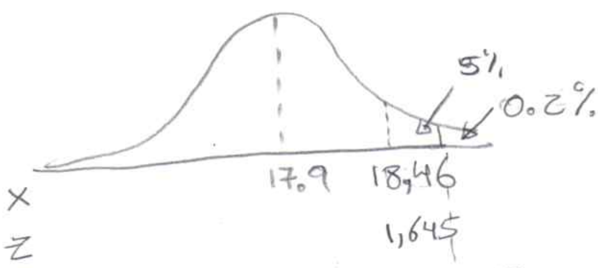
$\alpha = 0.02$ $\Delta = Z_{1-\frac{\alpha}{2}} \times \frac{s}{\sqrt{n}}$

$IC_{H98\%} = [18.04 , 19.65]$

$IC_{M98\%} = [17,69 , 19.66]$

b) $H_0 : \mu = 17.90$ $\bar{X}_{H_0} = \frac{1}{36} \sum_{i=1}^{36} X_{H_0 i} \sim N\left(17.90, \underbrace{\frac{4.28}{36}}_{0,1189}\right)$

$H_1 : \mu > 17.90$



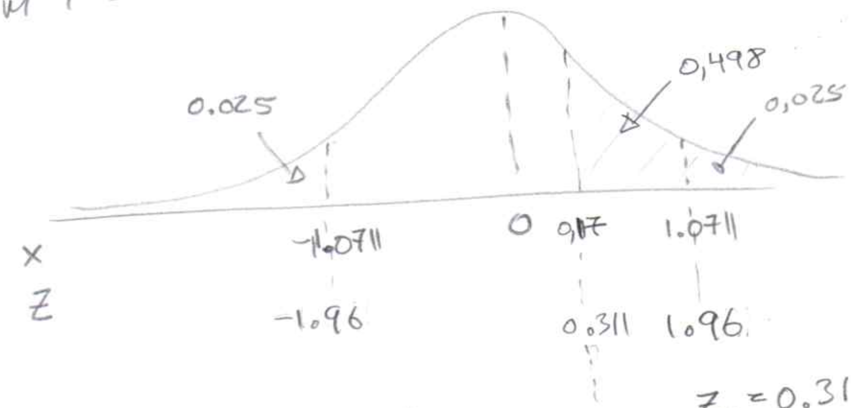
$5\% >> 0,2\%$

sim $18.85 \in RC$

c) $H_0 : \bar{X}_H - \bar{X}_M = 0$ $\bar{Y} = \bar{X}_H - \bar{X}_M \sim N(0, 0.1189 + 0.1798)$

$H_1 : \bar{X}_H - \bar{X}_M \neq 0$

$\bar{x}_H - \bar{x}_M = 0.17$



$Z_0 = 0.3111$

Valor $p = 2 P(Z_{H_0} > |z_0|)$

$= 2 \times 0.3779$

$= 0.7558$

9.8) $\hat{p}_A$ – "v.a prop aceitação marca A"

$\hat{p}_A = 0,4$

$\begin{cases} n = 400 \\ \hat{p}_{A_0} = \frac{180}{400} = 0,45 \end{cases}$

$\hat{p}_A = \frac{X}{n} \sim N\left(\hat{p}_A, \frac{0.45 \times 0.55}{400}\right)$

TLC
$n \geq 30$

$p_A \cdot q_n = 0.2475$

$H_0: \hat{p}_A = 0.4$

$H_1: \hat{p}_A > 0,4$

$\hat{p}_{A_{H_0}} = \frac{X}{N} \sim N\left(0,4, \frac{0.2475}{400}\right)$

$\delta^2 = 6.18 \cdot 10^{-4}$

$\delta = 0.02487$

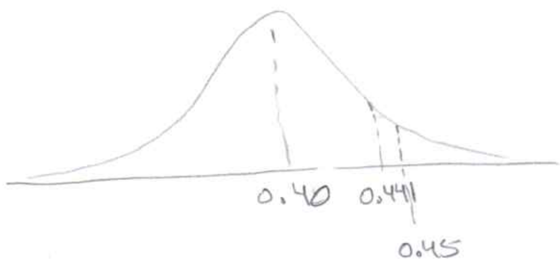
a) $\alpha = P(RH_0 | H_0 V) = P(\overline{X}_{H_0} > c) = 0,05$

$\frac{c - 0.4}{0.02487} = \Phi^{-1}(0.95)$

$= 1.645$

$c = (1.645 \times 0.02487) + 0,4$

$\simeq 0.441$



$RC_x = [0,441, +\infty[$; $0.45 \in RC_x$

sim beneficia

b) $IC_? = [0.42, 0.5]$ $\mu = 0.46$ $\Delta = 0,04$

$n = 300$

$\Delta = Z_{1-\frac{\alpha}{2}} \times \sqrt{\frac{0.2475}{300}}$

$Z_{1-\frac{\alpha}{2}} = \frac{\Delta}{\sqrt{\frac{0.2475}{300}}}$

$= 1,3926$

$1 - \frac{\alpha}{2} = \Phi(1,3926)$

$= 0,9181$

$\alpha = 0,1637$ $\therefore 1 - \alpha = 0.836$

83,6 %