Yudit Sharma

Heart rate mean = 72 bpm
Standard deivation = 10 bpm

sample size (n) = 64
Average bpm = 69

Q1)

a) population mean = 72 bpm
sample mean = 69 bpm

b) H_0 = There is no change in average heart rate with the use of the app

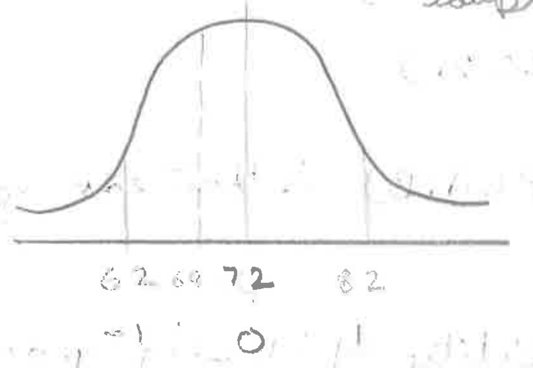
H_1 = There is a ~~change in~~ reduction in average heart rate with the use of the app.

H_0 = $W = \sim W$

H_1 = $W < \sim W$

(W = with app)
($\sim W$ = without app)

c)



Sample mean = 69

= Difference between standard and sample = 72 − 69
= 3

= standard error = $\frac{10}{3}$ = $3.3\overline{3}$

$Z = \frac{\sigma}{\sqrt{64}}$

σ = standard error

$\sqrt{64} = \sqrt{n}$

n = number of samples

$Z = \frac{\sigma}{8}$

$Z = \frac{3.3\overline{3}}{8}$

d) = $Z = \frac{\sigma}{\sqrt{n}}$

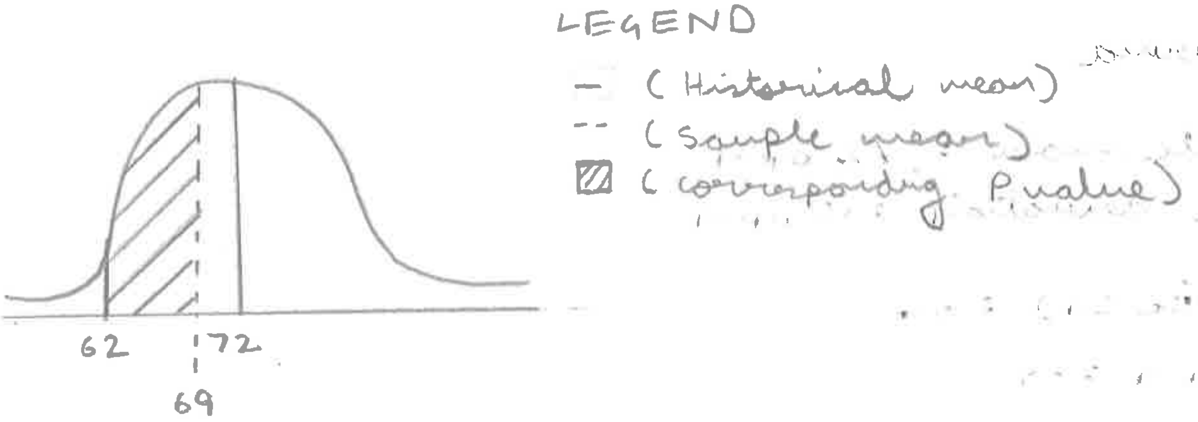
= σ = standard error

= $\sqrt{n}$ = no of samples

$Z = \frac{3.3\overline{3}}{\sqrt{64}}$

$= \frac{3.3\overline{3}}{8}$

e)



Q2)

$P(S) = 0.2$

$P(F|S) = 0.9$

$P(F|\sim S) = 0.05$

Bayes rule with substitution

$$P(S|F) = \frac{P(F|S) \times P(S)}{P(F|S) \times P(S) + P(F|\sim S)\, P(\sim S)} \qquad (2)$$

a) The prior value we have gotten here is $P(A)$ in this case (equation 2 given above) $P(S)$

- The value of $P(S) = 0.2$ (20%)

b) The posterior probability is $P(A|B)$ in ~~the case~~ ~~eqn~~ equation 2 it is $P(S|F)$

- Posterior states the probability of it being spam given the filter picks it up, the statement uses conditional probability.

c) Equation 2 is the expression after substitution.

$$P(S|F) = \frac{(0.9) \times (0.2)}{((0.9 \times 0.2)) + ((0.1) \times (0.8))}$$

$$= P(S|F) = \frac{0.18}{(0.18) + (0.08)}$$

c) continuation

$= \frac{0.18}{(0.26)}$

$= \frac{\cancel{9}}{1\cancel{3}} \quad \frac{0.9}{0.13} = 6.9 = 0.06$

d) ~~The~~ following the calculation we can observe that the posterior probability is lower than the prior probability since the filter is able to identity spam accurately with only a minor error chance of 5%

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