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Qu 1.

(a) population mean = 64

sample mean = 69

(b) null = new app does not reduce resting heart rates

Alternative : new app reduces resting heart rates

$H_0 = A_{new} \geq A_{old}$

$H_1 = A_{new} < A_{old}$

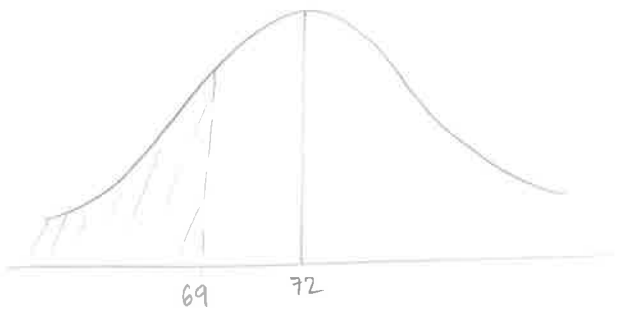
(c) $Se = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{64}} = \frac{10}{8} = \frac{5}{4}$

it shows how far the sample mean is from the baseline

(d) $z = \frac{69 - 72}{10/8} = \frac{3}{6} \times \frac{8}{10}_{5} = \frac{24}{5}$

$$z = \frac{S_m - \mu}{Se}$$

(e)



Qu 2

$P(S) = 20\% = 0.2$

$P(m/S) = 0.9$

$P(m/\sim S) = 0.05$

$$P(S/m) = \frac{P(S) \times P(m/S)}{P(m)}$$

(a) prior probability → $P(S)$

$P(S) = 0.2$

(b) posterior probability ⇒ $P(S/m)$

it is the probability that we are searching for which in this case is probability of spam given the message is spam.

(c)

$$P(S/m) = \frac{0.2 \times 0.9}{P(m/S) \cdot P(S) + P(m/\sim S) \cdot P(\sim S)}$$

$$= \frac{0.2 \times 0.9}{(0.9 \times 0.2) + (0.05 \times 0.8)}$$

$P(m)$ = total probability

$P(m) = P(m/S) \cdot P(S) + P(m/\sim S) \cdot P(\sim S)$

$= 0.9 \times 0.2 + 0.05 \times 0.8$ ← Ans

(d) lower, since it is a conditional probability, we have a new world. Since world is smaller, posterior probability will also be lower