Aryan Rao

Q.1) average $\mu = 72$ → population mean

$x = 69$:- Sample mean

$60 \text{ Sd} = 10$ $n = 64$

a) population mean here is 72 and sample mean is 69

b) null hypothesis :- The average resting heart rate of the app users is more than or equal to average resting heart rate of people who dont ;
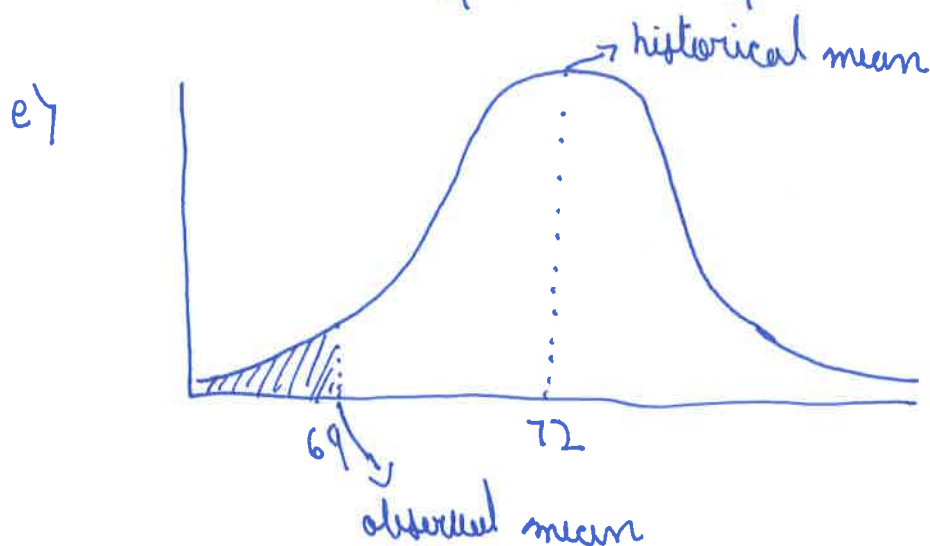
$$H_0 : x \geq \mu$$

Alternative hypothesis :- The average resting heart rate of app users is less than average resting heart rate of non users .

$$H_1 : x < \mu$$

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

d) $$\frac{x - \mu}{Se} = \frac{x - \mu}{\frac{5}{4}} = \frac{69 - 72}{\frac{5}{4}} = \frac{-3}{\frac{5}{4}} = \frac{-12}{5} \simeq -2.4$$

e)

→ historical mean

69 → observed mean   72

Q2. $p(S) = 0.2$

$p(F|S) = 0.9$

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

a) Based on the above equation the prior probability is p(A) which is the probability of messages being spam. The value is 0.2

b) The posterior probability in the above equation is P(A|B). Here the posterior probability is the probability of the message being a spam given that it has been marked "spam" by filter.

c)
$$P(B) = P(B \cap A) + P(B \cap \sim A)$$
$$\Rightarrow P(B|A) P(A) + P(B|\sim A) P(\sim A)$$
$$\Rightarrow 0.9 \times 0.2 + 0.05 \times 0.8$$

$$P(B|A) = 0.9 \quad P(B|\sim A) = 0.05$$
$$P(A) = 0.2 \quad P(\sim A) = 0.8$$

d) The posterior probability will be higher than the prior as the evidence factor is clearly more than one, around $\frac{0.9}{0.2}$ this will make the posterior probability automatically higher then prior