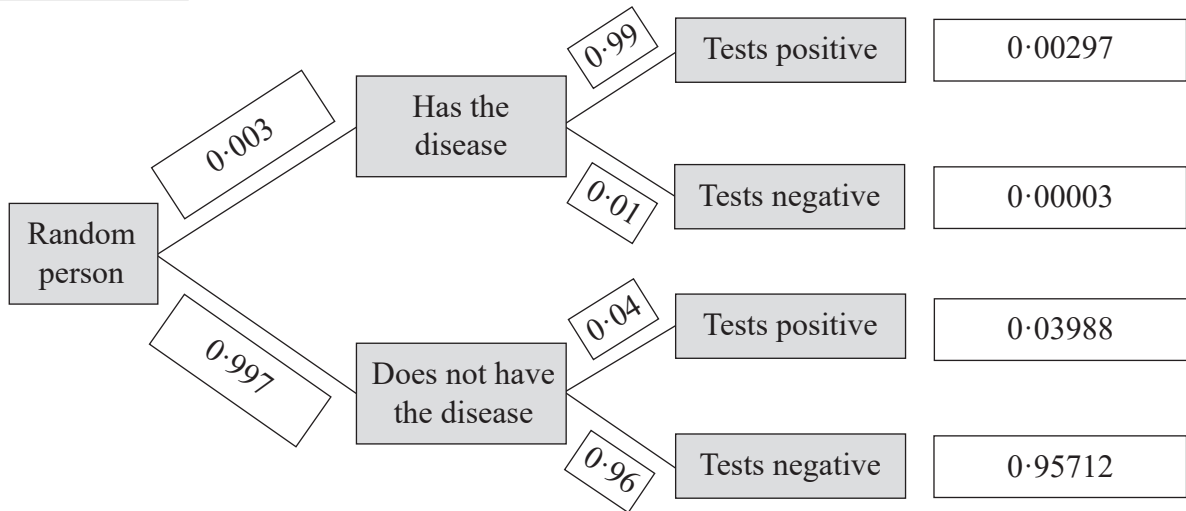


LC 2014: PAPER 2

QUESTION 8 (45 MARKS)

Question 8 (a) (i)



Question 8 (a) (ii)

$$P(\text{Tests positive}) = 0.00297 + 0.03988 = 0.04285$$

Question 8 (a) (iii)

$$P(\text{Person has the disease}) = \frac{P(\text{Tests positive with the disease})}{P(\text{Positive test})} = \frac{0.00297}{0.04285} = 0.0693$$

Question 8 (a) (iv)

No.

Only 6.93% of the people who test positive have the disease. Over 93% of those who test positive do not have the disease. This would cause unnecessary alarm in the community.

MARKING SCHEME NOTES**Question 8 (a) (i) [Scale 10C (0, 3, 7, 10)]**

- 3: • One element entered correctly
 • One column correct
 • Some indication that values lie between 0 and 1
- 7: • Two columns correct

Question 8 (a) (ii) [Scale 5C (0, 2, 3, 5)]

- 2: • One correct value chosen
 • Addition of values indicated
 • Configured correctly but no values entered
 • Answer outside range
- 3: • Correct values chosen but operator incorrect

Question 8 (a) (iii) [Scale 5C (0, 2, 3, 5)]

- 2: • One or both correct value(s) chosen only
 • Configured correctly but values not entered
 • Answer outside range
- 3: • Correct values chosen but incorrect operator leading to an answer within range

Question 8 (a) (iv) [Scale 5B (0, 2, 5)]

- 2: • Reason incorrect or incomplete

Question 8 (b) (i)

$P(\text{Generic drug being successful}) = 0.51$

Null hypothesis H_0 : Drug A is not more successful than the generic drug, $P = 0.51$

Alternative hypothesis H_A : Drug A is more successful than the generic drug, $P > 0.51$

$$P(\text{Drug } A \text{ being successful}) = \frac{296}{500}$$

$$n = 500$$

$$\text{Margin of error} = \frac{1}{\sqrt{n}} = \frac{1}{\sqrt{500}}$$

$$\text{Confidence interval at the 5\% level of significance: } \left(\frac{296}{500} - \frac{1}{\sqrt{500}}, \frac{296}{500} + \frac{1}{\sqrt{500}} \right) = (0.547, 0.637)$$

There is evidence to support the company's claim that their drug is more successful than the generic drug because, based on the sample data, any values in the range 54.73% – 66.67% are possible values for the proportion of people treated successfully by the company's drug.

We can say with 95% confidence that the percentage success of drug A is between 54.73% and 66.67%. Therefore, the null hypothesis is rejected. The company claims are true.

Question 8 (b) (ii)

This means that drug B is less successful than the generic drug.

$$\frac{x}{500} - \frac{1}{\sqrt{500}} < 0.51 \Rightarrow x = 500 \left(0.51 + \frac{1}{\sqrt{500}} \right) = 277.4$$

The greatest number of patients who could have been successfully treated was 277.

MARKING SCHEME NOTES

Question 8 (b) (i) [Scale 15D (0, 4, 7, 11, 15)]

- 4: • One relevant step e.g. null hypothesis stated only
• Some work towards margin of error
- 7: • Margin of error or observed proportion
• Margin of error and observed proportion found but fails to continue
- 11: • Failure to state null hypothesis correctly
• Failure to contextualise answer (e.g. Stops at reject Null Hypothesis)

Question 8 (b) (ii) [Scale 5B (0, 2, 5)]

- 2: • $\frac{n}{500}$ and stops
- Recognises interval where result must lie
• Some relevant work
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