

MS Module 4 t values and two confidence intervals practice exam questions

A statistician estimates the population mean for a normal distribution from a sample of 6 points.

- The upper bound of the 99% confidence interval for the population mean is 5.78.
- The lower bound of the 95% confidence interval for the population mean is 1.4.

Question 4.1: Critical t value

What is the critical t value for a 99% confidence interval from a sample of 6 points?

Answer 4.1: 4.0321 (table look-up)

Question 4.2: Critical t value

What is the critical t value for a 95% confidence interval from a sample of 6 points?

Answer 4.2: 2.5706 (table look-up)

Question 4.3: Standard error of estimated mean

What is the standard error of the estimated mean of the population?

Answer 4.3: $(5.78 - 1.4) / (4.0321 + 2.5706) = 0.6634$

(standard error of the estimated mean of the population = (upper bound of first confidence interval – lower bound of second confidence interval) / (critical t value of first confidence interval + critical t value of second confidence interval)

Question 4.4: Standard deviation of the sample

What is the standard deviation of the sample?

Answer 4.4: $0.6634 \times 6^{0.5} = 1.625$

(standard deviation of the sample = standard error of the estimated mean of the population \times square root of the number of observations in the sample)

Question 4.5: Estimated mean of the population

What is the estimated mean of the population?

Answer 4.5: (two formulas:)

- $5.78 - 4.0321 \times 0.6634 = 3.105$
- $1.4 + 2.5706 \times 0.6634 = 3.105$

(estimated mean of the population = upper bound of the confidence interval – critical t value \times standard error of the estimated mean OR lower bound of the confidence interval + critical t value \times standard error of the estimated mean)