3 The times, in minutes, taken by students to complete a test have mean μ and standard deviation σ. The times taken by a random sample of 100 students are noted and are used to calculate a 95% confidence interval for μ.

(a) Given that the end points of the 95% confidence interval are 31.02 and 33.98, correct to 4 significant figures, calculate the value of σ. [3]

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(b) The calculation of the confidence interval required the use of the Central Limit theorem.

Explain why it is valid to use the Central Limit theorem in this case. [1]

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(c) A researcher calculates a number, r, of 95% confidence interval for μ.

Find the largest value of r such that the probability that all r confidence intervals contain the true value of μ is greater than 0.5. [4]

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