3. The volume of water in a bottle has a normal distribution with **unknown** mean, μ millilitres, and **known** standard deviation, σ millilitres.

A random sample of 150 of the bottles of water gave a 95% confidence interval for μ of

(327.84, 329.76)

(a) Using the confidence interval given, test whether or not $\mu = 328$

State your hypotheses clearly and write down the significance level you have used.

(3)

A second random sample, of 200 of these bottles of water, had a mean volume of 328 millilitres.

(b) Calculate a 98% confidence interval for μ based on this second sample.

You must show all steps in your working.
(*Solutions relying entirely on calculator technology are not acceptable*.)

(6)

Using five different random samples of 200 of these bottles of water, five 98% confidence intervals for μ are to be found.

(c) Calculate the probability that more than 3 of these intervals will contain μ

(3)

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(Total for Question 3 is 12 marks)

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