

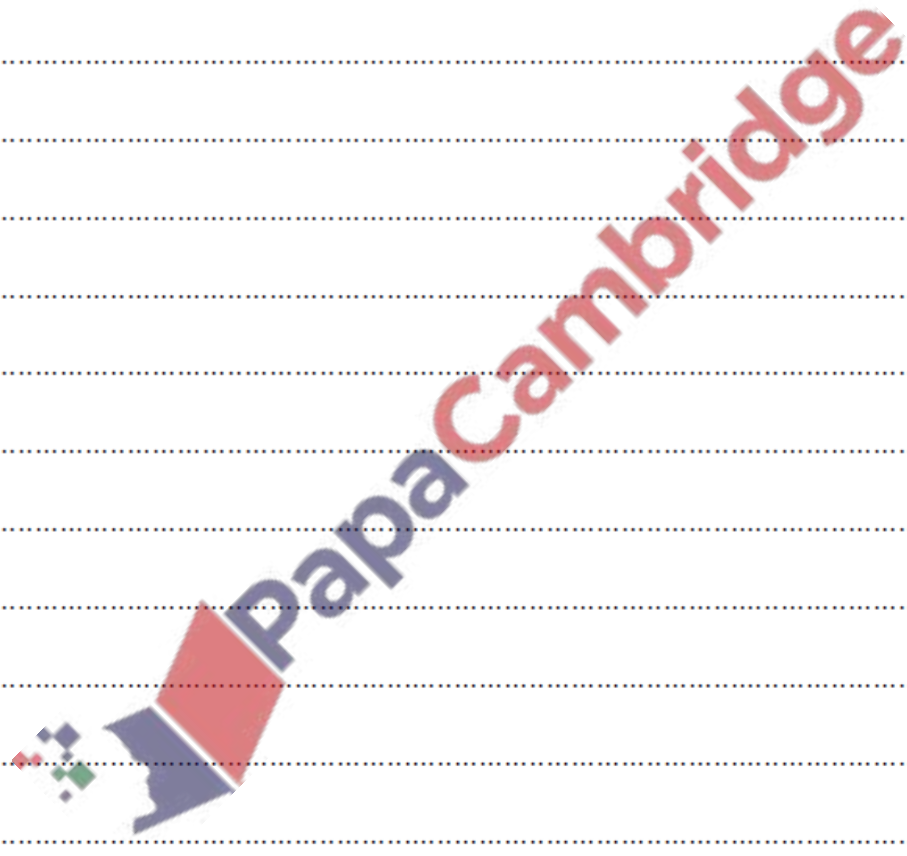
1. **March/2022/Paper_9709/62/No.1**

The lengths, in millimetres, of a random sample of 12 rods made by a certain machine are as follows.

200 201 198 202 200 199 199 201 197 202 200 199

(a) Find unbiased estimates of the population mean and variance. [3]

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(b) Give a statistical reason why these estimates may not be reliable. [1]

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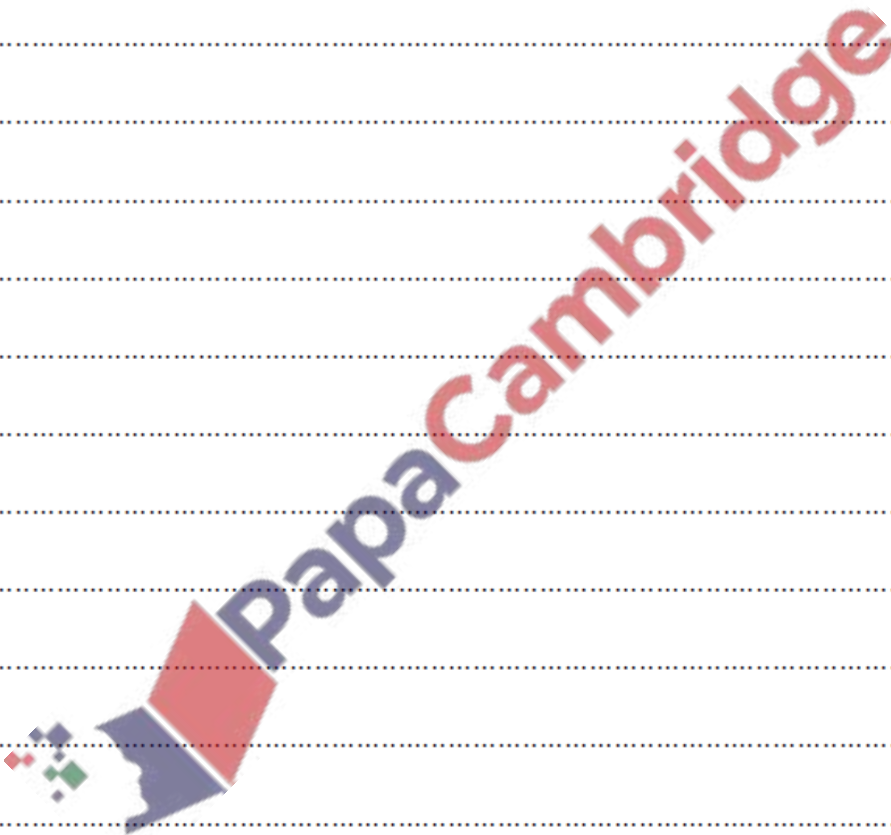
4. June/2022/Paper_9709/61/No.1

The diameters, x millimetres, of a random sample of 200 discs made by a certain machine were recorded. The results are summarised below.

$$n = 200 \quad \Sigma x = 2520 \quad \Sigma x^2 = 31852$$

(a) Calculate a 95% confidence interval for the population mean diameter. [6]

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(b) Jean chose 40 random samples and used each sample to calculate a 95% confidence interval for the population mean diameter.

How many of these 40 confidence intervals would be expected to include the true value of the population mean diameter? [1]

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5. June/2022/Paper_9709/62/No.1

- (a) A javelin thrower noted the lengths of a random sample of 50 of her throws. The sample mean was 72.3 m and an unbiased estimate of the population variance was 64.3 m^2 .

Find a 92% confidence interval for the population mean length of throws by this athlete. [3]

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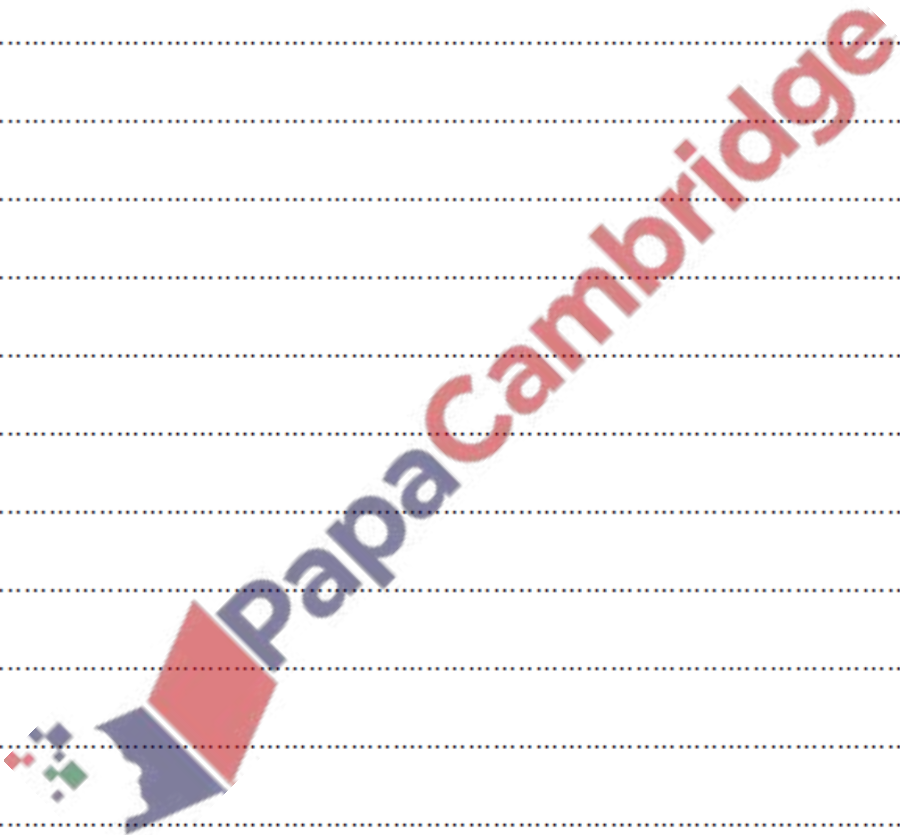
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- (b) A discus thrower wishes to calculate a 92% confidence interval for the population mean length of his throws. He bases his calculation on his first 50 throws in a week.

Comment on this method. [1]

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6. June/2022/Paper_9709/62/No.3

It is known that 1.8% of children in a certain country have not been vaccinated against measles. A random sample of 200 children in this country is chosen.

- (a) Use a suitable approximating distribution to find the probability that there are fewer than 3 children in the sample who have not been vaccinated against measles. [4]

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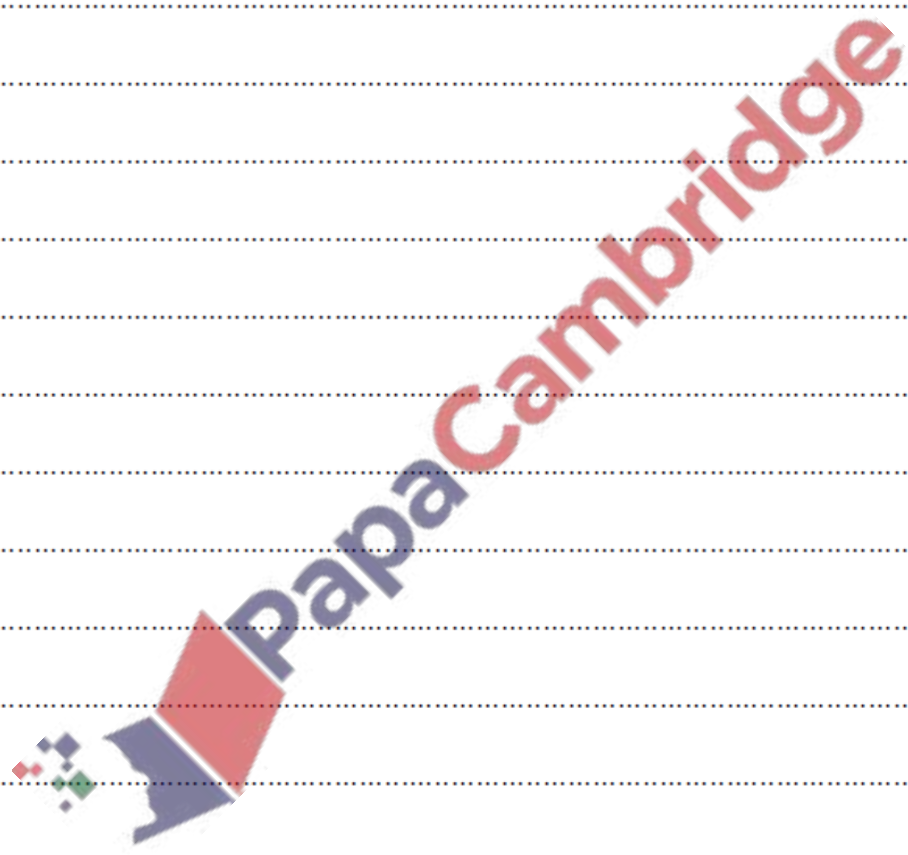
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- (b) Justify your approximating distribution. [2]

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8. June/2022/Paper_9709/63/No.6

A random sample of 5 values of a variable X is given below.

2 3 3 5 a

(a) Find an expression, in terms of a , for the mean of these values. [1]

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It is given that an unbiased estimate of the population variance of X , using these values, is 4. It is also given that a is positive.

(b) Find and simplify a quadratic equation in terms of a and hence find the value of a . [3]

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