



Cambridge International AS & A Level

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MATHEMATICS
9709/63

Paper 6 Probability & Statistics 2

May/June 2024
1 hour 15 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

 This document has **12** pages.



1 The random variable X has the distribution $B(4000, 0.001)$.

(a) Use a suitable approximating distribution to find $P(2 \leq X < 5)$.

[3]

[illegible]

(b) Justify your approximating distribution in this case.

[1]

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- (a) Calculate an estimate of the population standard deviation. [3]

[illegible]

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Find the probability that the total mass of 5 randomly chosen large bags of cement is greater than the total mass of 10 randomly chosen small bags of cement. [5]

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4 In this question you should **not** use an approximating distribution.

At an election in Menham last year, 24% of voters supported the Today Party. A student wishes to test whether support for the Today Party has decreased since last year. He chooses a random sample of 25 voters in Menham and finds that exactly 2 of them say that they support the Today Party.

Test at the 5% significance level whether support for the Today Party has decreased. [5]

[illegible]



5 A random variable X has probability density function f given by

$$f(x) = \begin{cases} ax - x^3 & 0 \leq x \leq \sqrt{2}, \\ 0 & \text{otherwise,} \end{cases}$$

where a is a constant.

(a) Show that $a = 2$. [3]

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(b) Find the median of X . [4]

[illegible]



(c) Find the exact value of $E(X)$.

[3]



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(b) State suitable null and alternative hypotheses for the test. [1]

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[4]

[illegible]

[1]

[illegible]



7 The independent random variables X and Y have the distributions $\text{Po}(1.9)$ and $\text{Po}(2.2)$ respectively.

(a) Find $P(X + Y < 4)$. [3]

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(b) Find the probability that $X = 2$ given that $X + Y < 4$. [4]

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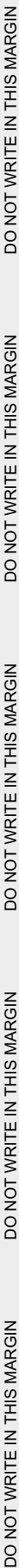
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[6]

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