



Cambridge International AS & A Level

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MATHEMATICS

9709/63

Paper 6 Probability & Statistics 2

May/June 2026

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. Do **not** use correction fluid or tape.
- 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. Any blank pages are indicated.



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- 2 Bettie believes that 30% of students at her school are vegetarian. Amir claims that the proportion is less than 30%. In order to test his claim, Amir takes a random sample of 20 students at the school. He finds that exactly 2 students in the sample say that they are vegetarian.

(a) Use a binomial distribution to test Amir's claim at the 2.5% significance level. [5]

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(b) State the smallest significance level at which Amir's claim would be rejected. Give your answer correct to 3 significant figures. [1]

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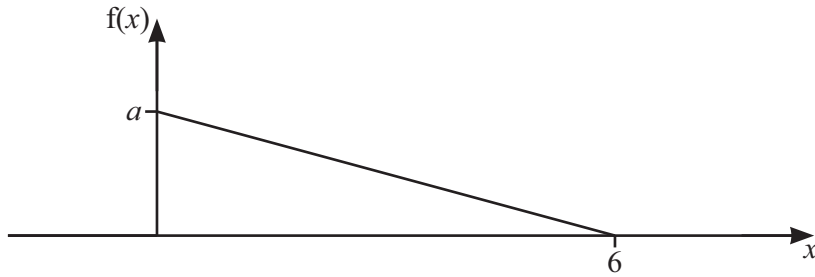
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3



A random variable X takes values between 0 and 6 only and has probability density function $f(x)$ as shown in the diagram, where a is a constant.

Given that $E(X) = 2$, find $\text{Var}(X)$.

[6]

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4 Cars arrive at a junction at a constant average rate of 3.2 per minute.

(a) State a condition for the number of cars arriving per minute to have a Poisson distribution. [1]

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It is now given that the number of cars arriving per minute has the distribution $Po(3.2)$.

(b) Find the probability that at least 4 cars arrive during a randomly chosen 3-minute period. [3]

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- (c) Given that at least 4 cars arrive during a particular randomly chosen 3-minute period, find the probability that exactly 5 cars arrive during this period. [2]

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- (d) Use a suitable approximating distribution to find the probability that more than 60 cars arrive during a randomly chosen 20-minute period. [5]

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- 5 The lengths, X cm, of Wamba snakes have mean μ cm. Research has shown that, for the whole population of Wamba snakes, $\mu = 41.5$. A researcher claims that, for the Wamba snakes in a particular region, the mean length is less than 41.5. She measures the lengths of a random sample of 150 Wamba snakes in this region. The results are summarised below.

$$n = 150$$

$$\Sigma x = 6030$$

$$\sum x^2 = 252014$$

- (a) Find unbiased estimates of the population mean and variance of X for Wamba snakes in this region, showing that the unbiased estimate of variance is 64.483 correct to 3 decimal places. [3]

[illegible]

- (b) Assuming that $\text{Var}(X) = 64.483$ for the whole population of Wamba snakes, test the researcher's claim at the 2% significance level. [5]

[illegible]



- (c) Use your answer to **5(b)** to explain whether it is possible for the researcher to make a Type I error.

[1]

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Later the researcher carries out a similar test at the 2% significance level, using the same hypotheses and another random sample of 150 Wamba snakes from this region.

- (d)** Given that the population mean length of Wamba snakes for this region is 38.7 cm, find the probability of a Type II error.

[5]

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- 6** One batch of a cake mixture contains X litres of ingredient A and Y litres of ingredient B , where X and Y have the independent distributions $X \sim N(25.5, 0.07)$ and $Y \sim N(26.0, 0.08)$.
- (a)** Find the probability that, in a randomly chosen batch of the mixture, the number of litres of ingredient A is greater than the number of litres of ingredient B . [5]

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The mass of 1 litre of ingredient A is m kg and the mass of 1 litre of ingredient B is $1.5m$ kg, where m is a constant.

- (b) Given that the probability that the total mass of a randomly chosen batch of the mixture is less than 70 kg is 0.3, find the value of m . [5]

[illegible]



Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.

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