Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0130405042

MATHEMATICS **9709/62**

Paper 6 Probability & Statistics 2 **October/November 2025**

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. Any blank pages are indicated.

© UCLES 2025

[Turn over

1 The number, X, of used computers donated to a charity has a constant average rate of 2.4 computers per week.

(a) State a necessary condition for X to have a Poisson distribution. [1]

.....

.....

.....

Now assume that X has a Poisson distribution.

(b) Calculate the probability that the number of computers donated during a 4-week period is more than 6 and less than 9. [3]

.....

.....

.....

.....

.....

.....

.....

.....

(c) Use a suitable approximating distribution to calculate the probability that more than 50 computers are donated during a 20-week period. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

2 The random variable X has a normal distribution with mean 10 and standard deviation 3. The independent random variable Y has a Poisson distribution with mean 4.

(a) Find the standard deviation of $X+Y$. [3]

(b) Find the standard deviation of $5X-Y$. [3]

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]

.....

.....

.....

.....

.....

.....

(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]

.....

.....

.....

(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]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

4 An inspector believes that 18% of cups made at a certain factory contain flaws. The factory owner claims that the true percentage is less than 18%. The inspector examines a random sample of 40 cups and finds that 3 of them contain flaws.

(a) Stating a necessary assumption, use a binomial distribution to test the factory owner's claim at the 5% significance level. [6]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) Explain why it would **not** be appropriate to use the Poisson approximation to the binomial distribution to carry out the test in part **(a)**. [1]

.....

.....

.....

.....

.....

.....

5 A random variable X has probability density function given by

$$f(x) = \begin{cases} k(2x^2 - x^3) & 0 \leqslant x \leqslant 2, \\ 0 & \text{otherwise.} \end{cases}$$

(a) Show that $k = \frac{3}{4}$. [3]

DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN

The median of X is denoted by m.

(b) (i) Write down the value of $P(X \leqslant m)$. [1]

(ii) Hence find $P(E(X) \leqslant X \leqslant m)$. [5]

DO NOT WRITE IN THIS MARGIN

6 The weekly profit, in dollars, made by a certain firm has a normal distribution. In the past, the weekly profit had the distribution N(736, 26^2). Following a change in management, the mean weekly profit for 35 randomly chosen weeks is \$725.

(a) Stating a necessary assumption, test at the 2% significance level whether the mean weekly profit has decreased. [6]

DO NOT WRITE IN THIS MARGIN

The mean weekly profit for another random sample of 35 weeks is found and a similar test is carried out at the 2% significance level.

(b) State the probability of a Type I error. [1]

.....

.....

.....

.....

(c) Given that the mean weekly profit is now in fact \$718, find the probability of a Type II error. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

Additional page

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

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN



BLANK PAGE

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

BLANK PAGE

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.