



Cambridge International AS & A Level

CANDIDATE
NAME

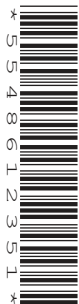
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CENTRE
NUMBER

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FURTHER MATHEMATICS

9231/41

Paper 4 Further Probability & Statistics

May/June 2023

1 hour 30 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.

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(c) Use the probability generating function of Z to find $E(Z)$. [2]

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- 6 The continuous random variable X has probability density function f given by

$$f(x) = \begin{cases} \frac{3}{28} \left(e^{\frac{1}{2}x} + 4e^{-\frac{1}{2}x} \right) & 0 \leq x \leq 2 \ln 3, \\ 0 & \text{otherwise.} \end{cases}$$

- (a) Find the cumulative distribution function of X . [3]

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The random variable Y is defined by $Y = e^{\frac{1}{2}(X)}$.

- (b) Find the probability density function of Y . [3]

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(c) Find the 30th percentile of Y . [3]

(d) Find $E(Y^4)$. [2]
