



Cambridge International AS & A Level

CANDIDATE
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CENTRE
NUMBER

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MATHEMATICS

9709/23

Paper 2 Pure Mathematics 2

October/November 2022

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 **16** pages. Any blank pages are indicated.



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6

4 (a) By sketching a suitable pair of graphs on the same diagram, show that the equation

$$e^{-\frac{1}{2}x} = x^5$$

has exactly one real root.

[2]

(b) Use the iterative formula $x_{n+1} = \sqrt[5]{e^{-\frac{1}{2}x_n}}$ to determine the root correct to 4 significant figures. Give the result of each iteration to 6 significant figures. [3]

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(b) Show by calculation that the x -coordinate of B lies between 3.0 and 3.1. [3]

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(c) Use the trapezium rule with two intervals to find an approximation to the area of the shaded region. Give your answer correct to 2 decimal places. [3]

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(c) Find $\int f(\theta) d\theta$. [2]

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