



Cambridge International AS & A Level

CANDIDATE
NAME



CENTRE
NUMBER

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MATHEMATICS

9709/32

Paper 3 Pure Mathematics 3

October/November 2024

1 hour 50 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

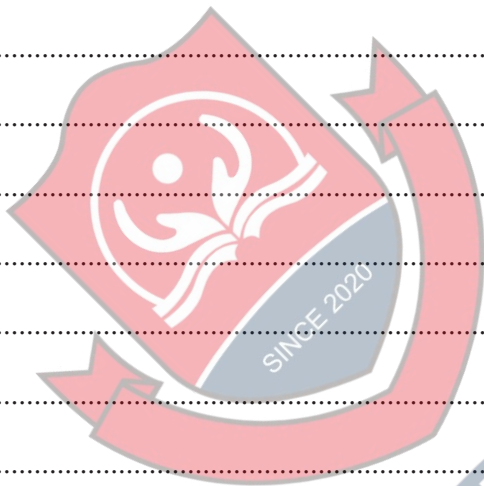
INSTRUCTIONS

- 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 75.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Any blank pages are indicated.

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[2]

[1]

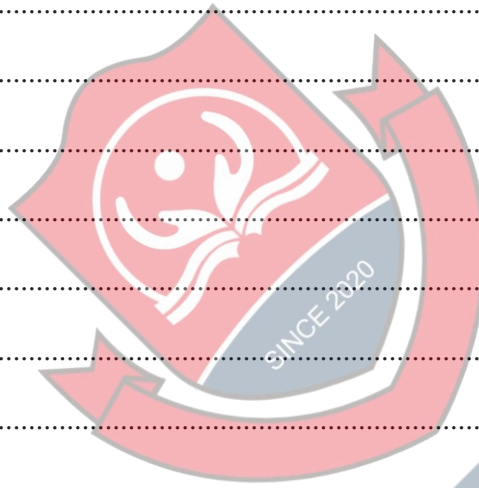
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4 Solve the equation $5^x = 5^{x+2} - 10$. Give your answer correct to 3 decimal places.



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- 5 (a)** The complex number u is given by

$$u = \frac{(\cos \frac{1}{7}\pi + i \sin \frac{1}{7}\pi)^4}{\cos \frac{1}{7}\pi - i \sin \frac{1}{7}\pi}.$$

Find the exact value of $\arg u$.

[2]

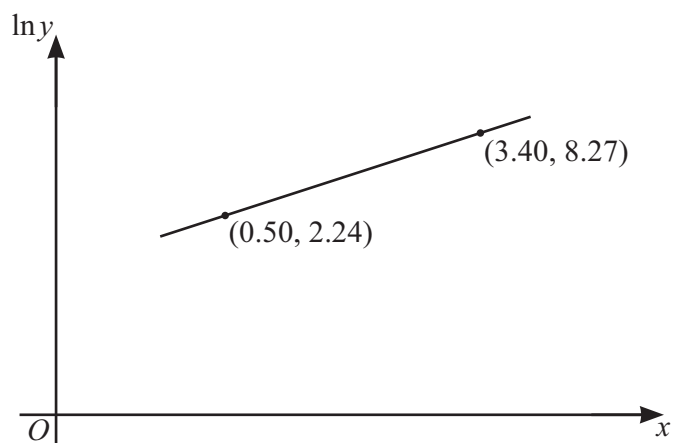
- (b) The complex numbers u and u^* are plotted on an Argand diagram.

Describe the single geometrical transformation that maps u onto u^* and state the exact value of $\arg u^*$. [2]

[2]



6



The variables x and y satisfy the equation $ay = b^x$, where a and b are constants. The graph of $\ln y$ against x is a straight line passing through the points $(0.50, 2.24)$ and $(3.40, 8.27)$, as shown in the diagram.

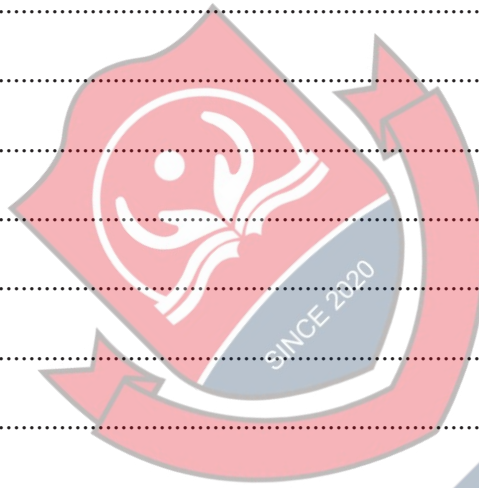
Find the values of a and b . Give each value correct to 1 significant figure.

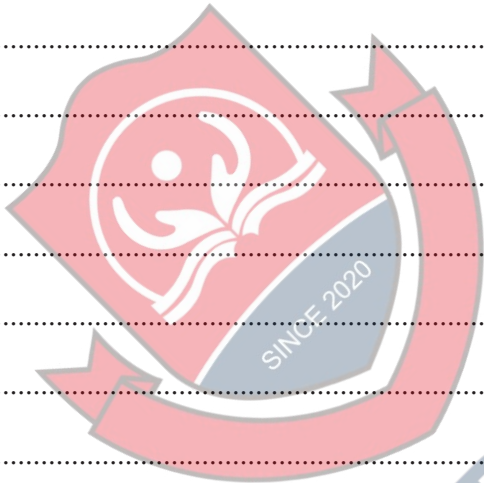
[4]



- $$\tan^4 x - 2 \tan^2 x - 3 = 0$$

[3]





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$$x = \tan^2 2t, \quad y = \cos 2t,$$

(a) Show that $\frac{dy}{dx} = -\frac{1}{2}\cos^3 2t$.

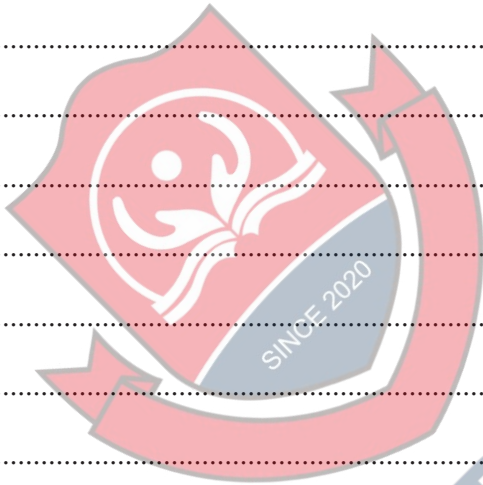
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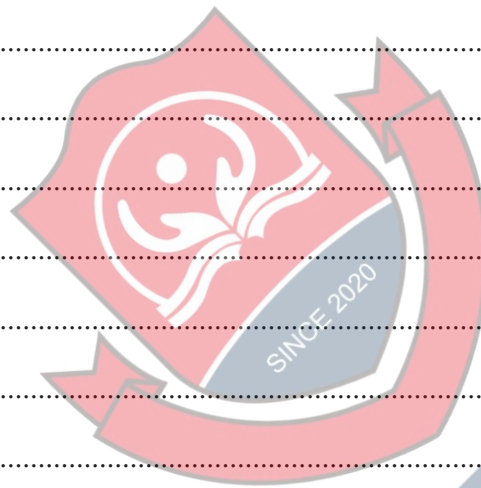


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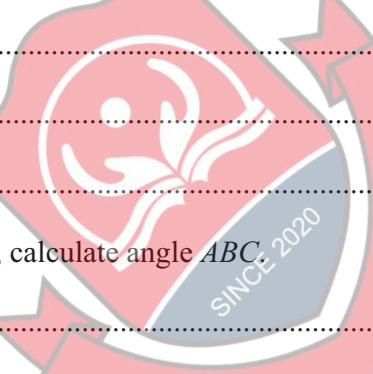
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[5]



- (a)** Show that r and t satisfy the differential equation

$$\frac{dr}{dt} = \frac{50-r}{5r^2}. \quad [3]$$

- (b) Find the quotient and remainder when $5r^2$ is divided by $50-r$. [3]



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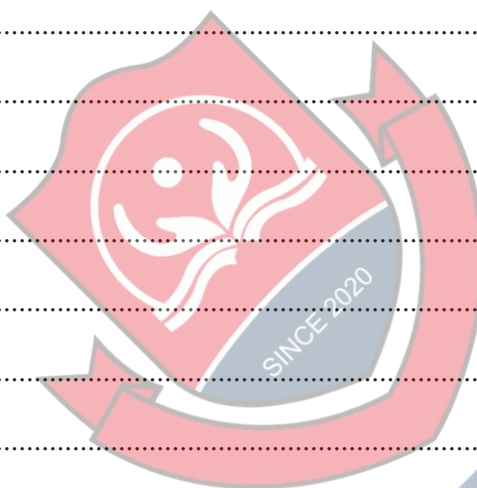
(a) Find $f'(x)$ and hence find the exact coordinates of the stationary point of the curve with equation $y = f(x)$. [5]



- (b) Use the substitution $u = e^x$ and partial fractions to find the exact value of $\int_{\ln 3}^{\ln 5} f(x) dx$.

Give your answer in the form $\ln a$, where a is a rational number in its simplest form.

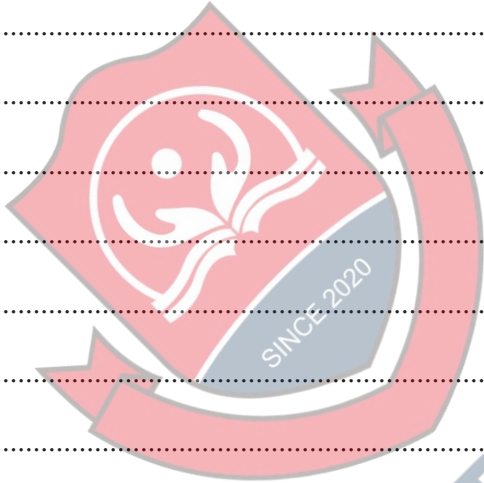
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If you use the following page to complete the answer to any question, the question number must be clearly shown.



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