

# Cambridge International AS & A Level

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

MATHEMATICS 9709/32

Paper 3 Pure Mathematics 3

February/March 2022

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 [ ].

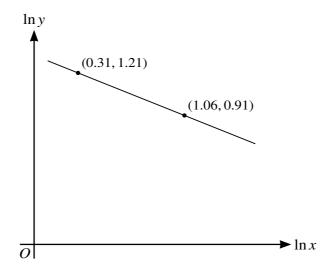
This document has 20 pages. Any blank pages are indicated.

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2 On a sketch of an Argand diagram, shade the region whose points represent complex numbers z satisfying the inequalities  $|z+2-3i| \le 2$  and  $\arg z \le \frac{3}{4}\pi$ . [4]

3



The variables x and y satisfy the equation  $x^n y^2 = C$ , where n and C are constants. The graph of  $\ln y$  against  $\ln x$  is a straight line passing through the points (0.31, 1.21) and (1.06, 0.91), as shown in the diagram.

Find the value of $n$ and find the value of $C$ correct to 2 decimal places.	[5]
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			6	
4	The parametric equations o	f a curve are		
		$x = 1 - \cos \theta,$	$y = \cos \theta - \frac{1}{4}\cos 2\theta.$	
	Show that $\frac{dy}{dx} = -2\sin^2(\frac{1}{2}\theta)$	).		[5]
		•••••		
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	$tan(\alpha + \beta) = 2$ and	$\tan \alpha = 3 \tan \beta$ .
Find the possible values of	$\alpha$ and $\beta$ .	[0

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(a)	By sketching a suitable pair of graphs, show that the equation $4 - x^2 = \sec \frac{1}{2}x$ has exactly one root in the interval $0 \le x < \pi$ .
<b>(b)</b>	Verify by calculation that this root lies between 1 and 2. [2]
(c)	Use the iterative formula $x_{n+1} = \sqrt{4 - \sec \frac{1}{2}x_n}$ to determine the root correct to 2 decimal places. Give the result of each iteration to 4 decimal places. [3]

Hence find the exact value of	_		$4x^2 + 1$	-ax.				
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<b>9</b> The variables x and y satisfy the differential equal
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and y satisfy the differential equation 
$$(x+1)(3x+1)\frac{\mathrm{d}y}{\mathrm{d}x} = y,$$

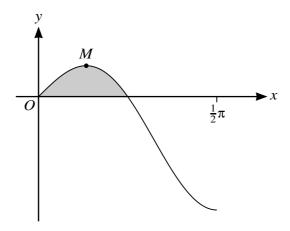
and it is given that y = 1 when x = 1.

Solve the differential equation and find the exact value of $y$ when $x = 3$ , giving your answer in a simplified form. [9]


(a)	Find a vector equation for the line through $A$ and $B$ .
<b>(b)</b>	Find the acute angle between the directions of $AB$ and $l$ , giving your answer in degrees.
(b)	Find the acute angle between the directions of $AB$ and $l$ , giving your answer in degrees.
<b>(b)</b>	
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The diagram shows the curve  $y = \sin x \cos 2x$  for  $0 \le x \le \frac{1}{2}\pi$ , and its maximum point M.

(a)	Find the $x$ -coordinate of $M$ , giving your answer correct to 3 significant figures.	[6]

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## **Additional Page**

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