

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes

Paper

reference

WFM03/01

Mathematics

**International Advanced Subsidiary/Advanced Level
Further Pure Mathematics F3**

You must have:

Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

Candidates may use any calculator allowed by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear.
Answers without working may not gain full credit.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 8 questions in this question paper. The total mark for this paper is 75.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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Question 1 continued

Handwriting practice area with 30 horizontal lines.

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Question 1 continued

Lined area for writing the answer to Question 1.



Question 1 continued

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Q1

(Total 8 marks)



Question 2 continued

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Question 2 continued

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Q2

(Total 8 marks)





Question 3 continued

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Question 3 continued

Lined area for writing the answer to Question 3.



Question 3 continued

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Q3

(Total 9 marks)



4.

$$\mathbf{M} = \begin{pmatrix} 6 & k & 2 \\ k & 5 & 0 \\ 2 & 0 & 7 \end{pmatrix}$$

where k is a constant.

Given that 3 is an eigenvalue of $\mathbf{M}$,

(a) determine the possible values of k .

(3)

Given that $k < 0$

(b) determine the other eigenvalues of $\mathbf{M}$.

(3)

(c) Determine a normalised eigenvector corresponding to the eigenvalue 3

(3)



Question 4 continued

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Question 4 continued

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Question 4 continued

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(Total 9 marks)

Q4

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5. Determine

$$(i) \int \frac{1}{\sqrt{x^2 - 3x + 5}} dx \quad (3)$$

$$(ii) \int \frac{1}{\sqrt{63 + 4x - 4x^2}} dx \quad (4)$$

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Question 5 continued

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Question 5 continued

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Q5

(Total 7 marks)



6.

$$I_n = \int e^x \sin^n x \, dx \quad n \in \mathbb{Z} \quad n \geq 0$$

(a) Show that

$$I_n = \frac{e^x \sin^{n-1} x}{n^2 + 1} (\sin x - n \cos x) + \frac{n(n-1)}{n^2 + 1} I_{n-2} \quad n \geq 2 \quad (6)$$

(b) Hence find the exact value of

$$\int_0^{\frac{\pi}{2}} e^x \sin^4 x \, dx$$

giving your answer in the form $Ae^{\frac{\pi}{2}} + B$ where A and B are rational numbers to be determined.

(4)



Question 6 continued

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Question 6 continued

Lined area for writing the answer to Question 6.



Question 6 continued

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Q6

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(Total 10 marks)



P 7 1 1 0 2 A 0 2 5 3 6

$$\frac{x-3}{4} = \frac{y-5}{-2} = \frac{z-4}{7}$$
$$2x + 4y - z = 1$$

(a) Determine the coordinates of P (3)

(b) Determine, to one decimal place, the value of θ (3)

(c) determine a vector equation for l_2

[illegible]

Question 7 continued

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Question 7 continued

Lined area for writing the answer to Question 7.



Question 7 continued

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Q7

(Total 11 marks)





Question 8 continued

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Question 8 continued

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Question 8 continued

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Question 8 continued

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Q8

(Total 13 marks)

TOTAL FOR PAPER: 75 MARKS

END

