

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

Thursday 15 June 2023

Morning (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 permitted 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 2 continued

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Question 3 continued

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Question 4 continued

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5.

$$\mathbf{M} = \begin{pmatrix} 1 & 2 & k \\ -1 & -3 & 4 \\ 2 & 6 & -8 \end{pmatrix} \text{ where } k \text{ is a constant}$$

Given that \mathbf{M} has a repeated eigenvalue, determine

- (i) the possible values of k ,
- (ii) all corresponding eigenvalues of \mathbf{M} for each value of k .

(7)

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Question 5 continued

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Question 6 continued

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Question 7 continued

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Question 7 continued

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8. (a) Differentiate $x \operatorname{arcosh} 5x$ with respect to x

(b) Hence, or otherwise, show that

$$\int_{\frac{1}{4}}^{\frac{3}{5}} \operatorname{arcosh} 5x \, dx = \frac{3}{20} - \frac{2\sqrt{2}}{5} + \ln(p + q\sqrt{2})^k - \frac{1}{4} \ln r$$

where p , q , r and k are rational numbers to be determined.

(8)

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Question 8 continued

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Lined writing area for the answer to Question 8.



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Question 8 continued

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Question 8 continued

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(Total for Question 8 is 10 marks)

TOTAL FOR PAPER IS 75 MARKS

