

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel Level 3 GCE

Friday 17 May 2024

Afternoon Paper reference **8FM0/24**

Further Mathematics
Advanced Subsidiary
Further Mathematics options
24: Further Statistics 2
(Part of option G only)

You must have:
 Mathematical Formulae and Statistical Tables (Green), 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.
- Values from statistical tables should be quoted in full. If a calculator is used instead of tables the value should be given to an equivalent degree of accuracy.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- The total mark for this part of the examination is 40. There are 5 questions.
- 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.

Turn over ►

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1. A continuous random variable X has cumulative distribution function $F(x)$ given by

$$F(x) = \begin{cases} 0 & x < -1 \\ \frac{1}{5}(x+1)^2 & -1 \leq x \leq 0 \\ 1 - \frac{1}{20}(4-x)^2 & 0 < x \leq 4 \\ 1 & x > 4 \end{cases}$$

- (a) Find the probability density function, $f(x)$ (2)

- (b) (i) Sketch $f(x)$ (2)

- (ii) Hence describe the skewness of the distribution. (1)

- (c) Find, to 3 significant figures, the value of c such that

$$P(1 < X < c) = P(c < X < 2) \quad (3)$$



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Question 1 continued

Lined area for writing the answer to Question 1.



Question 1 continued

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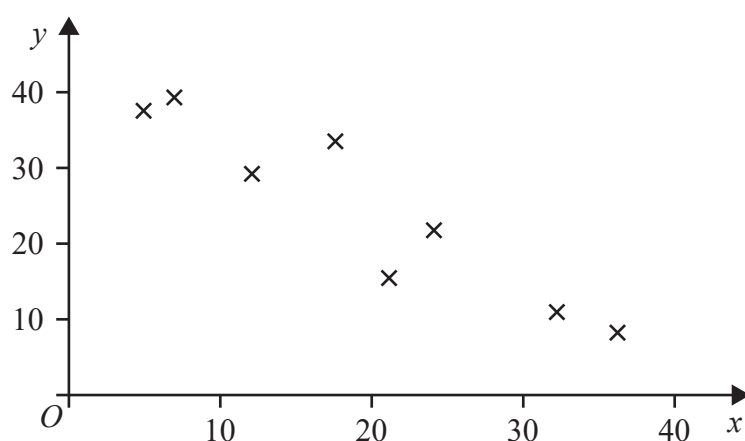
Question 1 continued

Lined area for writing the answer to Question 1.

(Total for Question 1 is 8 marks)



2. A random sample of size $n = 8$ of paired data is taken from a population. The data are plotted below.



Test, at the 1% level of significance, whether or not there is evidence of a negative **rank** correlation between the two variables.

You should state your hypotheses and critical value and show your working clearly.

(7)

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Question 2 continued

Lined area for writing the answer to Question 2.

(Total for Question 2 is 7 marks)



3. The continuous random variable Y has probability density function

$$f(y) = \begin{cases} \frac{1}{24}(y+2)(4-y) & 0 \leq y \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Show that the mode of Y is 1, justifying your reasoning.

(2)

Given that $P(Y < 1) = \frac{13}{36}$

- (b) determine whether the median of Y is less than, equal to, or greater than 2
Give a reason for your answer.

(2)

Given that $E(Y^2) = \frac{213}{80}$

- (c) find, using algebraic integration, $\text{Var}(2Y)$

(5)



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Question 3 continued

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Question 3 continued

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Question 3 continued

Lined area for writing answers.

(Total for Question 3 is 9 marks)



4. The continuous random variable X is uniformly distributed over the interval $[2, 7]$

(a) Write down the value of $E(X)$

(1)

(b) Find $P(1 < X < 4)$

(1)

(c) Find $P(2X^2 - 15X + 27 > 0)$

(3)

(d) Find $E\left(\frac{3}{X^2}\right)$

(3)



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Question 4 continued

Lined area for writing the answer to Question 4.

(Total for Question 4 is 8 marks)



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Question 5 continued

Lined area for writing the answer to Question 5.



Question 5 continued

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(Total for Question 5 is 8 marks)

TOTAL FOR FURTHER STATISTICS 2 IS 40 MARKS

