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Pearson Edexcel Level 3 GCE

Time 1 hour 30 minutes

Paper
reference

9FM0/3B

Further Mathematics

Advanced

PAPER 3B: Further Statistics 1

You must have:

Mathematical Formulae and Statistical Tables (Green), 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.
- Values from statistical tables should be quoted in full. If a calculator is used instead of the 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.
- There are 7 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.

Turn over ►

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3. During the summer, mountain rescue team *A* receives calls for help randomly with a rate of 0.4 per day.

- (a) Find the probability that during the summer, mountain rescue team *A* receives at least 19 calls for help in 28 randomly selected days. (2)

The leader of mountain rescue team *A* randomly selects 250 summer days from the last few years.

She records the number of calls for help received on each of these days.

- (b) Using a Poisson approximation, estimate the probability of the leader finding at least 20 of these days when more than 1 call for help was received by mountain rescue team *A*. (4)

Mountain rescue team *A* believes that the number of calls for help per day is lower in the winter than in the summer. The number of calls for help received in 42 randomly selected winter days is 8

- (c) Use a suitable test, at the 5% level of significance, to assess whether or not there is evidence that the number of calls for help per day is lower in the winter than in the summer. State your hypotheses clearly. (4)

During the summer, mountain rescue team *B* receives calls for help randomly with a rate of 0.2 per day, independently of calls to mountain rescue team *A*.

The random variable *C* is the total number of calls for help received by mountain rescue teams *A* and *B* during a period of *n* days in the summer.

On a Monday in the summer, mountain rescue teams *A* and *B* each receive a call for help.

Given that over the next *n* days $P(C = 0) < 0.001$

- (d) calculate the minimum value of *n* (3)
- (e) Write down an assumption that needs to be made for the model to be appropriate. (1)

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