



Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

AS FURTHER MATHEMATICS

Paper 2 Statistics

7366/2S

Thursday 16 May 2019 Afternoon

Time allowed: 1 hour 30 minutes

For this paper:

- You must have the AQA formulae and statistical tables booklet for A-level Mathematics and A-level Further Mathematics.
- You should have a scientific calculator that meets the requirements of the specification. (You may use a graphical calculator.)
- You must ensure you have the other optional Question Paper/Answer Book for which you are entered (EITHER Discrete OR Mechanics). You will have 1 hour 30 minutes to complete BOTH papers.

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

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INSTRUCTIONS

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer ALL questions.
- You must answer each question in the space provided for that question. If you require extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do NOT write on blank pages.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

INFORMATION

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 40.

ADVICE

- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- You do not necessarily need to use all the space provided.

DO NOT TURN OVER UNTIL TOLD TO DO SO



Answer ALL questions in the spaces provided.

- 1 The discrete random variable X has the following probability distribution function

$$P(X = x) = \begin{cases} \frac{5-x}{10} & x = 1, 2, 3, 4 \\ 0 & \text{otherwise} \end{cases}$$

Find $P(X \geq 3)$

Circle your answer. [1 mark]

0.1

0.15

0.2

0.3



2 A binomial hypothesis test was carried out at the 5% level of significance with the hypotheses

$$H_0 : p = 0.6$$

$$H_1 : p > 0.6$$

A sample of size 30 was used to carry out the test.

Find the probability that a Type I error was made.

Circle your answer. [1 mark]

4.4%

4.8%

5.0%

9.4%

[Turn over]



4 (c) Find $E(2X^{-1} - 3)$ [2 marks]



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[Turn over for the next question]



[Turn over]



- 5 (b) State TWO conditions under which a discrete uniform distribution can be used to model the score when a cubic dice is rolled. [2 marks]

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[Turn over for the next question]



6 A company owns two machines, *A* and *B*, which make toys. Both machines run continuously and independently.

Machine *A* makes an average of 2 errors per hour.

6 (a) Using a Poisson model, find the probability that the machine makes exactly 5 errors in 4 hours, giving your answer to three significant figures. [2 marks]

6 (b) Machine *B* makes an average of 5 errors per hour. Both machines are switched on and run for 1 hour.

The company finds the probability that the total number of errors made by machines *A* and *B* in 1 hour is greater than 8.

If the probability is greater than 0.4, a new machine will be purchased.

Using a Poisson model, determine whether or not the toy company will purchase a new machine. [3 marks]

[Turn over]





- 6 (c) After investigation, the standard deviation of errors made by machine *A* is found to be 0.5 errors per hour and the standard deviation of errors made by machine *B* is also found to be 0.5 errors per hour.

Explain whether or not the use of Poisson models in parts (a) and (b) is appropriate.
[2 marks]

[Turn over]



- 7 Mohammed is conducting a medical trial to study the effect of two drugs, *A* and *B*, on the amount of time it takes to recover from a particular illness.

Drug *A* is used by one group of 60 patients and drug *B* is used by a second group of 60 patients.

The results are summarised in the table:

		RECOVERY TIME			
		1 WEEK	2 WEEKS	3 WEEKS	TOTAL
DRUG	<i>A</i>	36	19	5	60
	<i>B</i>	21	24	15	60
	TOTAL	57	43	20	120

Mohammed claims that there is an association between recovery time and drug used.

- 7 (a) Investigate Mohammed's claim using the 1% level of significance. [7 marks]



7 (b) Interpret any association between recovery time and the drug used. [2 marks]

END OF QUESTIONS

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