January 2012

Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	6	8	4	/	0	1	Signature	

Paper Reference(s)

6684/01

Edexcel GCE

Statistics S2

Advanced/Advanced Subsidiary

Tuesday 17 January 2012 – Morning

Time: 1 hour 30 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
Total	

Materials required for examination
Mathematical Formulae (Pink)

Items included with question papers
Nil

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

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions.
You must write your answer to each question in the space following the question.
Values from the statistical tables should be quoted in full. When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 7 questions in this question paper. The total mark for this paper is 75.
There are 20 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You should show sufficient working to make your methods clear to the Examiner.
Answers without working may not gain full credit.

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Turn over

PEARSON

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1. The time in minutes that Elaine takes to checkout at her local supermarket follows a continuous uniform distribution defined over the interval [3, 9].

Find

(a) Elaine's expected checkout time,

(1)

(b) the variance of the time taken to checkout at the supermarket,

(2)

(c) the probability that Elaine will take more than 7 minutes to checkout.

(2)

Given that Elaine has already spent 4 minutes at the checkout,

(d) find the probability that she will take a total of less than 6 minutes to checkout.

(3)

Leave blank

2. David claims that the weather forecasts produced by local radio are no better than those achieved by tossing a fair coin and predicting rain if a head is obtained or no rain if a tail is obtained. He records the weather for 30 randomly selected days. The local radio forecast is correct on 21 of these days.

Test David's claim at the 5% level of significance.

State your hypotheses clearly.

(7)

Leave blank

3. The probability of a telesales representative making a sale on a customer call is 0.15

Find the probability that

(a) no sales are made in 10 calls,

(2)

(b) more than 3 sales are made in 20 calls.

(2)

Representatives are required to achieve a mean of at least 5 sales each day.

(c) Find the least number of calls each day a representative should make to achieve this requirement.

(2)

(d) Calculate the least number of calls that need to be made by a representative for the probability of at least 1 sale to exceed 0.95

(3)

Leave blank

4. A website receives hits at a rate of 300 per hour.

(a) State a distribution that is suitable to model the number of hits obtained during a 1 minute interval.

(1)

(b) State two reasons for your answer to part (a).

(2)

Find the probability of

(c) 10 hits in a given minute,

(3)

(d) at least 15 hits in 2 minutes.

(3)

The website will go down if there are more than 70 hits in 10 minutes.

(e) Using a suitable approximation, find the probability that the website will go down in a particular 10 minute interval.

(7)

Leave blank

Question 4 continued

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5. The probability of an electrical component being defective is 0.075
The component is supplied in boxes of 120

(a) Using a suitable approximation, estimate the probability that there are more than 3 defective components in a box.

(5)

A retailer buys 2 boxes of components.

(b) Estimate the probability that there are at least 4 defective components in each box.

(2)

Leave blank

Question 5 continued

Q5

(Total 7 marks)

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6. A random variable X has probability density function given by

$$f(x) = \begin{cases} \frac{1}{2} & 0 \leqslant x < 1 \\ x - \frac{1}{2} & 1 \leqslant x \leqslant k \\ 0 & \text{otherwise} \end{cases}$$

where k is a positive constant.

(a) Sketch the graph of $f(x)$.

(2)

(b) Show that $k = \frac{1}{2}(1+\sqrt{5})$.

(4)

(c) Define fully the cumulative distribution function $F(x)$.

(6)

(d) Find $P(0.5 < X < 1.5)$.

(2)

(e) Write down the median of X and the mode of X.

(2)

(f) Describe the skewness of the distribution of X. Give a reason for your answer.

(2)

Leave blank

Question 6 continued

Leave blank

7. (a) Explain briefly what you understand by

(i) a critical region of a test statistic,

(ii) the level of significance of a hypothesis test.

(2)

(b) An estate agent has been selling houses at a rate of 8 per month. She believes that the rate of sales will decrease in the next month.

(i) Using a 5% level of significance, find the critical region for a one tailed test of the hypothesis that the rate of sales will decrease from 8 per month.

(ii) Write down the actual significance level of the test in part (b)(i).

(3)

The estate agent is surprised to find that she actually sold 13 houses in the next month. She now claims that this is evidence of an increase in the rate of sales per month.

(c) Test the estate agent's claim at the 5% level of significance. State your hypotheses clearly.

(5)

Leave blank

Question 7 continued