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

Monday 16 January 2006 – 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 (Green or lilac)

Items included with question papers
Nil

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration. Thus candidates may NOT use calculators such as the Texas Instruments TI 89, TI 92, Casio CFX 9970G, Hewlett Packard HP 48G.

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. You must write your answers for 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 16 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 must show sufficient working to make your methods clear to the examiner. Answers without working may gain no credit.

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1. A fair coin is tossed 4 times.

Find the probability that

(a) an equal number of heads and tails occur,

(2)

(b) all the outcomes are the same,

(3)

(c) the first tail occurs on the third throw.

(2)

Leave blank

Question 1 continued

Q1

(Total 7 marks)

Leave blank

2. Accidents on a particular stretch of motorway occur at an average rate of 1.5 per week.

(a) Write down a suitable model to represent the number of accidents per week on this stretch of motorway.

(1)

Find the probability that

(b) there will be 2 accidents in the same week,

(2)

(c) there is at least one accident per week for 3 consecutive weeks,

(3)

(d) there are more than 4 accidents in a 2 week period.

(3)

Leave blank

Question 2 continued

Q2

(Total 9 marks)

Leave blank

3. The random variable X is uniformly distributed over the interval $[-1, 5]$.

(a) Sketch the probability density function $f(x)$ of X.

(3)

Find

(b) $E(X)$,

(1)

(c) $\text{Var}(X)$,

(2)

(d) $P(-0.3 < X < 3.3)$

(2)

Leave blank

Question 3 continued

Q3

(Total 8 marks)

Leave blank

4. The random variable $X \sim \mathrm{B}(150, 0.02)$.

Use a suitable approximation to estimate $\mathrm{P}(X > 7)$.

(4)

Q4

(Total 4 marks)

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5. A continuous random variable X has probability density function f(x) where

$$\text{f}(x) = \begin{cases} kx(x-2), & 2 \leqslant x \leqslant 3, \\ 0, & \text{otherwise,} \end{cases}$$

where k is a positive constant.

(a) Show that $k = \frac{3}{4}$.

(4)

Find

(b) E(X),

(3)

(c) the cumulative distribution function F(x).

(6)

(d) Show that the median value of X lies between 2.70 and 2.75.

(2)

Leave blank

Question 5 continued

(Total 15 marks)

Q5

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6. A bag contains a large number of coins. Half of them are 1p coins, one third are 2p coins and the remainder are 5p coins.

(a) Find the mean and variance of the value of the coins.

(4)

A random sample of 2 coins is chosen from the bag.

(b) List all the possible samples that can be drawn.

(3)

(c) Find the sampling distribution of the mean value of these samples.

(6)

Leave blank

Question 6 continued

(Total 13 marks)

Q6

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7. A teacher thinks that 20% of the pupils in a school read the Deano comic regularly.

He chooses 20 pupils at random and finds 9 of them read Deano.

(a) (i) Test, at the 5% level of significance, whether or not there is evidence that the percentage of pupils that read Deano is different from 20%. State your hypotheses clearly.

(ii) State all the possible numbers of pupils that read Deano from a sample of size 20 that will make the test in part (a)(i) significant at the 5% level.

(9)

The teacher takes another 4 random samples of size 20 and they contain 1, 3, 1 and 4 pupils that read Deano.

(b) By combining all 5 samples and using a suitable approximation test, at the 5% level of significance, whether or not this provides evidence that the percentage of pupils in the school that read Deano is different from 20%.

(8)

(c) Comment on your results for the tests in part (a) and part (b).

(2)

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Q7

(Total 19 marks)

TOTAL FOR PAPER: 75 MARKS

END