Paper Reference(s)

6691/01

Edexcel GCE

Statistics S3

Advanced Level

Monday 19 June 2006 – Morning

Time: 1 hour 30 minutes

Materials required for examination	Items included with question papers
Mathematical Formulae (Green)	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 on the answer book, write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Statistics S3), the paper reference (6685), your surname, other name and signature.
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.
This paper has 8 questions.
The total mark for this paper is 75.

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.

1. Describe one advantage and one disadvantage of

(*a*) quota sampling,

(2)

(*b*) simple random sampling.

(2)

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2. A report on the health and nutrition of a population stated that the mean height of three-year old children is 90 cm and the standard deviation is 5 cm. A sample of 100 three-year old children was chosen from the population.

(*a*) Write down the approximate distribution of the sample mean height. Give a reason for your answer.

(3)

(*b*) Hence find the probability that the sample mean height is at least 91 cm.

(3)

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3. A biologist investigated whether or not the diet of chickens influenced the amount of cholesterol in their eggs. The cholesterol content of 70 eggs selected at random from chickens fed diet *A* had a mean value of 198 mg and a standard deviation of 47 mg. A random sample of 90 eggs from chickens fed diet *B* had a mean cholesterol content of 201 mg and a standard deviation of 23 mg.

(*a*) Stating your hypotheses clearly and using a 5% level of significance, test whether or not there is a difference between the mean cholesterol content of eggs laid by chickens fed on these two diets.

(7)

(*b*) State, in the context of this question, an assumption you have made in carrying out the test in part (*a*).

(2)

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4. The table below shows the price of an ice cream and the distance of the shop where it was purchased from a particular tourist attraction.

Shop	Distance from tourist attraction (m)	Price (£)
A	50	1.75
B	175	1.20
C	270	2.00
D	375	1.05
E	425	0.95
F	580	1.25
G	710	0.80
H	790	0.75
I	890	1.00
J	980	0.85

(*a*) Find, to 3 decimal places, the Spearman rank correlation coefficient between the distance of the shop from the tourist attraction and the price of an ice cream.

(5)

(*b*) Stating your hypotheses clearly and using a 5% one-tailed test, interpret your rank correlation coefficient.

(4)

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5. The workers in a large office block use a lift that can carry a maximum load of 1090 kg. The weights of the male workers are normally distributed with mean 78.5 kg and standard deviation 12.6 kg. The weights of the female workers are normally distributed with mean 62.0 kg and standard deviation 9.8 kg.

Random samples of 7 males and 8 females can enter the lift.

(*a*) Find the mean and variance of the total weight of the 15 people that enter the lift.

(4)

(*b*) Comment on any relationship you have assumed in part (*a*) between the two samples.

(1)

(*c*) Find the probability that the maximum load of the lift will be exceeded by the total weight of the 15 people.

(4)

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6. A research worker studying colour preference and the age of a random sample of 50 children obtained the results shown below.

Age in years	Red	Blue	Totals
4	12	6	18
8	10	7	17
12	6	9	15
Totals	28	22	50

Using a 5% significance level, carry out a test to decide whether or not there is an association between age and colour preference. State your hypotheses clearly.

(11)

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7. A machine produces metal containers. The weights of the containers are normally distributed. A random sample of 10 containers from the production line was weighed, to the nearest 0.1 kg, and gave the following results

49.7, 50.3, 51.0, 49.5, 49.9

50.1, 50.2, 50.0, 49.6, 49.7.

(*a*) Find unbiased estimates of the mean and variance of the weights of the population of metal containers.

(5)

The machine is set to produce metal containers whose weights have a population standard deviation of 0.5 kg.

(*b*) Estimate the limits between which 95% of the weights of metal containers lie.

(4)

(*c*) Determine the 99% confidence interval for the mean weight of metal containers.

(5)

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8. Five coins were tossed 100 times and the number of heads recorded. The results are shown in the table below.

Number of heads	0	1	2	3	4	5
Frequency	6	18	29	34	10	3

(*a*) Suggest a suitable distribution to model the number of heads when five unbiased coins are tossed.

(2)

(*b*) Test, at the 10% level of significance, whether or not the five coins are unbiased. State your hypotheses clearly.

(11)

TOTAL FOR PAPER: 75 MARKS

END