

Paper Reference(s)

6683

Edexcel GCE

Statistics S1

Advanced/Advanced Subsidiary

Tuesday 4 November 2003 – Morning

Time: 1 hour 30 minutes

Materials required for examination

Answer Book (AB16)

Graph Paper (ASG2)

Mathematical Formulae (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 on the answer book, write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Statistics S1), the paper reference (6683), 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 seven questions.

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. A company wants to pay its employees according to their performance at work. The performance score x and the annual salary, y in £100s, for a random sample of 10 of its employees for last year were recorded. The results are shown in the table below.

x	15	40	27	39	27	15	20	30	19	24
y	216	384	234	399	226	132	175	316	187	196

[You may assume $\Sigma xy = 69\,798$, $\Sigma x^2 = 7\,266$]

- (a) Draw a scatter diagram to represent these data. (4)
- (b) Calculate exact values of S_{xy} and S_{xx} . (4)
- (c) (i) Calculate the equation of the regression line of y on x , in the form $y = a + bx$.
 Give the values of a and b to 3 significant figures.
 (ii) Draw this line on your scatter diagram. (5)
- (d) Interpret the gradient of the regression line. (1)

The company decides to use this regression model to determine future salaries.

- (e) Find the proposed annual salary for an employee who has a performance score of 35. (2)
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2. A fairground game involves trying to hit a moving target with a gunshot. A round consists of up to 3 shots. Ten points are scored if a player hits the target, but the round is over if the player misses. Linda has a constant probability of 0.6 of hitting the target and shots are independent of one another.

(a) Find the probability that Linda scores 30 points in a round. (2)

The random variable X is the number of points Linda scores in a round.

(b) Find the probability distribution of X . (5)

(c) Find the mean and the standard deviation of X . (5)

A game consists of 2 rounds.

(d) Find the probability that Linda scores more points in round 2 than in round 1. (6)

3. Cooking sauces are sold in jars containing a stated weight of 500 g of sauce. The jars are filled by a machine. The actual weight of sauce in each jar is normally distributed with mean 505 g and standard deviation 10 g.

(a) (i) Find the probability of a jar containing less than the stated weight.
(ii) In a box of 30 jars, find the expected number of jars containing less than the stated weight. (5)

The mean weight of sauce is changed so that 1% of the jars contain less than the stated weight. The standard deviation stays the same.

(b) Find the new mean weight of sauce. (4)

4. Explain what you understand by

(a) a sample space, (1)

(b) an event. (1)

Two events A and B are independent, such that $P(A) = \frac{1}{3}$ and $P(B) = \frac{1}{4}$.

Find

(c) $P(A \cap B)$, (1)

(d) $P(A | B)$, (2)

(e) $P(A \cup B)$. (2)

5. The random variable X has the discrete uniform distribution

$$P(X=x) = \frac{1}{n}, \quad x = 1, 2, \dots, n.$$

Given that $E(X) = 5$,

(a) show that $n = 9$. (3)

Find

(b) $P(X < 7)$, (2)

(c) $\text{Var}(X)$. (4)

6. A travel agent sells holidays from his shop. The price, in £, of 15 holidays sold on a particular day are shown below.

299	1050	2315	999	485
350	169	1015	650	830
99	2100	689	550	475

For these data, find

- (a) the mean and the standard deviation, (3)
- (b) the median and the inter-quartile range. (4)

An outlier is an observation that falls either more than $1.5 \times$ (inter-quartile range) above the upper quartile or more than $1.5 \times$ (inter-quartile range) below the lower quartile.

- (c) Determine if any of the prices are outliers. (3)

The travel agent also sells holidays from a website on the Internet. On the same day, he recorded the price, £ x , of each of 20 holidays sold on the website. The cheapest holiday sold was £98, the most expensive was £2400 and the quartiles of these data were £305, £1379 and £1805. There were no outliers.

- (d) On graph paper, and using the same scale, draw box plots for the holidays sold in the shop and the holidays sold on the website. (4)
- (e) Compare and contrast sales from the shop and sales from the website. (2)

END