

Analysis of Data

Question Paper

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|------------|--------------------------------------|
| Level | Pre U |
| Subject | Maths |
| Exam Board | Cambridge International Examinations |
| Topic | Statistics- Analysis of Data |
| Booklet | Question Paper |

Time Allowed: 48 minutes

Score: /40

Percentage: /100

Grade Boundaries:

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1 The table shows fuel economy figures in miles per gallon (mpg) for some new cars.

| | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Car | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| Mpg | 57 | 40 | 34 | 33 | 11 | 17 | 30 | 27 | 31 | 20 | 35 | 24 | 26 | 23 | 32 |

- (i) Find the median and quartiles for the mpg of these fifteen cars. [2]
- (ii) Use the values in part (i) to identify any cars for which the mpg is an outlier. [3]

2 The masses, in kilograms, of 100 chickens on sale in a large supermarket were recorded as follows.

| | | | | | |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Mass (x kg) | $1.6 \leq x < 1.8$ | $1.8 \leq x < 2.0$ | $2.0 \leq x < 2.2$ | $2.2 \leq x < 2.4$ | $2.4 \leq x < 2.6$ |
| Number of chickens | 16 | 27 | 28 | 18 | 11 |

Calculate estimates of the mean and standard deviation of the masses of these chickens. [5]

3 Pupils at a certain school carried out a survey of traffic passing the school during a two-hour period one morning. One pupil recorded the number of people in each of the first 100 cars. Her results were as follows.

| | | | | | |
|------------------|----|----|----|----|---|
| Number of people | 1 | 2 | 3 | 4 | 5 |
| Number of cars | 48 | 26 | 14 | 10 | 2 |

Find the mean and the standard deviation of the number of people per car in her sample. [4]

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- 4 At a local athletics club, data on the ages of the members and their times to run a 10 km course are recorded. For a random sample of 25 club members aged between 20 and 60, their ages (x years) and times (y minutes) are summarised as follows.

$$n = 25 \quad \Sigma x = 1002 \quad \Sigma x^2 = 43\,508 \quad \Sigma y = 1865 \quad \Sigma y^2 = 142\,749 \quad \Sigma xy = 77\,532$$

- (i) Calculate the product moment correlation coefficient for these data. [4]
- (ii) Show that the equation of the least squares regression line of y on x is $y = 0.83x + 41.28$, where the coefficients are given correct to 2 decimal places. [4]
- (iii) Use the equation given in part (ii) to estimate the time taken by someone who is
- (a) 50 years old,
- (b) 65 years old.
- Comment on the validity of each of these estimates. [4]

- 5 The heights in centimetres of 10 young women were measured and are given below.

140 145 162 174 153 167 147 151 148 156

Calculate the mean height of these women and show that the standard deviation is approximately 10 cm. [4]

- 6** A survey was conducted into the annual salary offered for 19 different jobs in 2008. The results were as follows, in thousands of pounds.

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|-----|----|
| 15 | 16 | 18 | 19 | 21 | 36 | 36 | 38 | 41 | 41 |
| 43 | 47 | 51 | 55 | 56 | 60 | 62 | 64 | 110 | |

- (a)** **(i)** Find the median and interquartile range of this set of data. [3]
(ii) Show that £110 000 is an outlier and discuss briefly how this outlier might be treated. [2]

It was decided to undertake a further study to see if self-esteem was correlated with level of annual salary. A random sample of 11 employees was taken and self-esteem was rated on a scale of 1 to 10 with the highest self-esteem being 10.

The results were as follows.

| | | | | | | | | | | | |
|---------------------|---|---|---|---|---|---|---|---|----|----|----|
| Salary in £10 000's | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Self-esteem | 4 | 3 | 5 | 1 | 7 | 7 | 8 | 5 | 10 | 7 | 9 |

- (b)** **(i)** Calculate the product-moment correlation coefficient and comment on the result. [3]
(ii) “The best way to increase self-esteem is to pay people more money.” Comment on this claim. [2]