

1. As part of a statistics project, Gill collected data relating to the length of time, to the nearest minute, spent by shoppers in a supermarket and the amount of money they spent. Her data for a random sample of 10 shoppers are summarised in the table below, where t represents time and $\pounds m$ the amount spent over $\pounds 20$.

t (minutes)	$\pounds m$
15	-3
23	17
5	-19
16	4
30	12
6	-9
32	27
23	6
35	20
27	6

- (a) Write down the actual amount spent by the shopper who was in the supermarket for 15 minutes.

(1)

- (b) Calculate S_{tt} , S_{mm} and S_{tm} .

(You may use $\Sigma t^2 = 5478$ $\Sigma m^2 = 2101$ $\Sigma tm = 2485$)

(6)

- (c) Calculate the value of the product moment correlation coefficient between t and m .

(3)

- (d) Write down the value of the product moment correlation coefficient between t and the actual amount spent. Give a reason to justify your value.

(2)

On another day Gill collected similar data. For these data the product moment correlation coefficient was 0.178

- (e) Give an interpretation to both of these coefficients.

(2)

- (f) Suggest a practical reason why these two values are so different.

(1)



Question 1 continued



Turn over

Question 1 continued

2. In a factory, machines A , B and C are all producing metal rods of the same length. Machine A produces 35% of the rods, machine B produces 25% and the rest are produced by machine C . Of their production of rods, machines A , B and C produce 3%, 6% and 5% defective rods respectively.

(a) Draw a tree diagram to represent this information.

(3)

(b) Find the probability that a randomly selected rod is

(i) produced by machine A and is defective,

(ii) is defective.

(5)

(c) Given that a randomly selected rod is defective, find the probability that it was produced by machine C .

(3)



Question 2 continued

Q2

(Total 11 marks)



3. The random variable X has probability function

$$P(X=x) = \frac{(2x-1)}{36} \quad x = 1, 2, 3, 4, 5, 6.$$

- (a) Construct a table giving the probability distribution of X .

(3)

Find

- (b) $P(2 < X \leq 5)$,

(2)

- (c) the exact value of $E(X)$.

(2)

- (d) Show that $\text{Var}(X) = 1.97$ to 3 significant figures.

(4)

- (e) Find $\text{Var}(2 - 3X)$.

(2)

No longer on syllabus



Question 3 continued

Q3

(Total 13 marks)



4. Summarised below are the distances, to the nearest mile, travelled to work by a random sample of 120 commuters.

Distance (to the nearest mile)	Number of commuters
0–9	10
10–19	19
20–29	43
30–39	25
40–49	8
50–59	6
60–69	5
70–79	3
80–89	1

For this distribution,

- (a) describe its shape, (1)

- (b) use linear interpolation to estimate its median. (2)

The mid-point of each class was represented by x and its corresponding frequency by f giving

$$\Sigma fx = 3550 \quad \text{and} \quad \Sigma fx^2 = 138020$$

- (c) Estimate the mean and the standard deviation of this distribution. (3)

One coefficient of skewness is given by

$$\frac{3(\text{mean} - \text{median})}{\text{standard deviation}}.$$

- (d) Evaluate this coefficient for this distribution. (3)

- (e) State whether or not the value of your coefficient is consistent with your description in part (a). Justify your answer. (2)



Question 4 continued

(a) Give a reason to support the use of a histogram to represent these data.

(1)

(1)

(3)

(d) Find the total number of children in the group.

(2)

Question 5 continued

(Total 7 marks)

(3)

Question 6 continued

(Total 5 marks)



- (4)

(b) Find, to the nearest integer, the value of k .

(6)

Question 7 continued

(Total 10 marks)

END

