Statistics and Probability

Review Questions
For Quiz 3

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

$$\begin{aligned}[\text{median}] &= \frac{4+5}{2} \\ &= \frac{9}{2} \\ &= 4.5\end{aligned}$$

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

(b) Write down the value of

(i) the mode;

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

(b) Write down the value of

(i) the mode;

mode = 4

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

(b) Write down the value of

(i) the mode;

(ii) the upper quartile. [2]

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

(b) Write down the value of

(i) the mode;

(ii) the upper quartile. [2]

$$Q_3 = \frac{6+7}{2}$$

$$= \frac{13}{2}$$

$$= 6.5$$

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

(b) Write down the value of

(i) the mode;

(ii) the upper quartile. [2]

(c) Find the probability that managers received no more than 5 calls in a randomly chosen hour. [2]

The number of phone calls per hour that store managers receive during the day are shown below.

3 5 6 2 4 7 4 9

(a) Find the median number of calls. [2]

(b) Write down the value of

(i) the mode;

(ii) the upper quartile. [2]

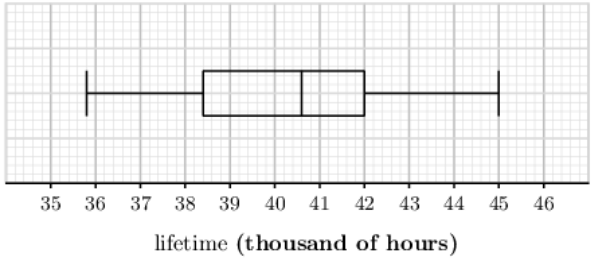
(c) Find the probability that managers received no more than 5 calls in a randomly chosen hour. [2]

$$[\Pr(\text{no more than 5 calls})] = \frac{\text{Number of hours recorded with 5 calls or less}}{\text{Total number of hours that were recorded}}$$

$$= \frac{5}{8}$$

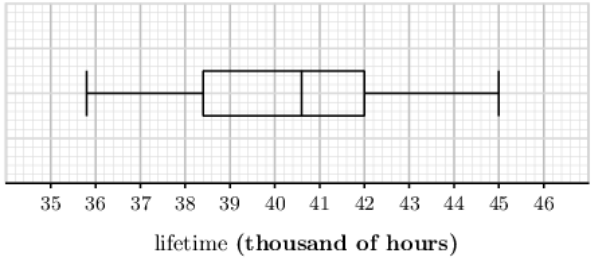
$$= 0.625$$

The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.

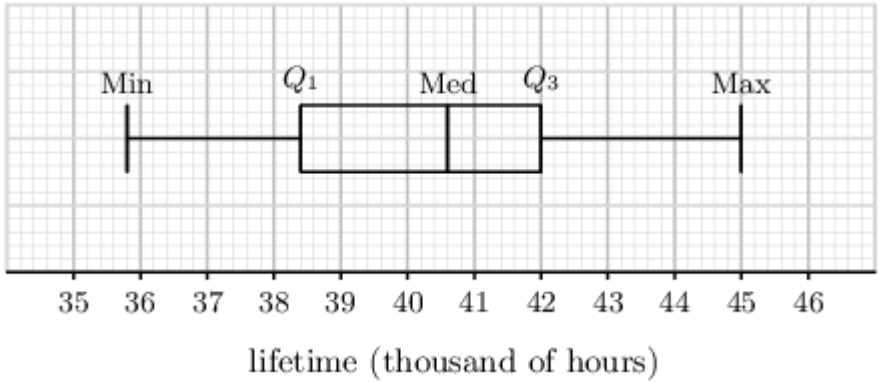


(a) Write down the median lifetime of these LED bulbs. [1]

The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.

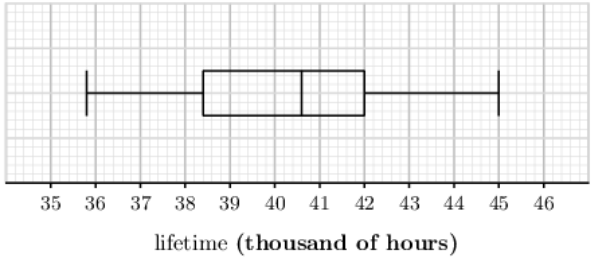


(a) Write down the median lifetime of these LED bulbs. [1]



median = 40 600 hours.

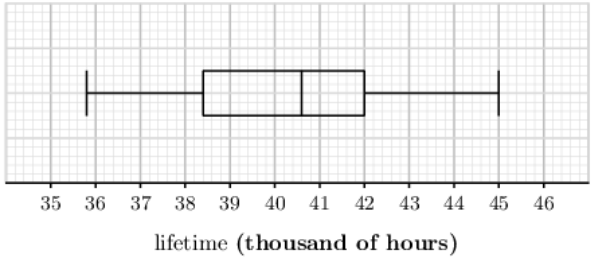
The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.



(a) Write down the median lifetime of these LED bulbs. [1]

(b) Write down the upper quartile. [1]

The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.

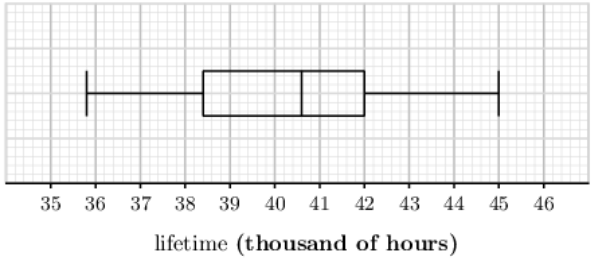


(a) Write down the median lifetime of these LED bulbs. [1]

(b) Write down the upper quartile. [1]

$Q_3 = 42\,000$ hours

The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.

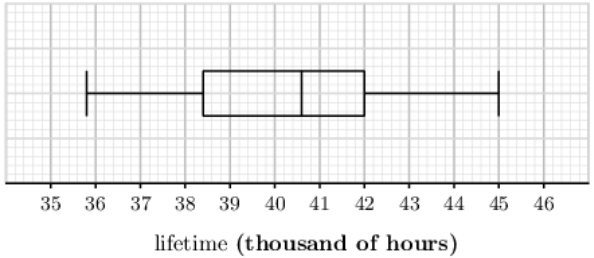


(a) Write down the median lifetime of these LED bulbs. [1]

(b) Write down the upper quartile. [1]

(c) Find the interquartile range. [2]

The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.



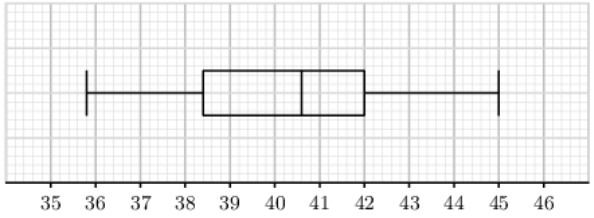
(a) Write down the median lifetime of these LED bulbs. [1]

(b) Write down the upper quartile. [1]

(c) Find the interquartile range. [2]

$$\begin{aligned} \text{IQR} &= Q_3 - Q_1 \\ &= 42\,000 - 38\,400 \\ &= 3600 \end{aligned}$$

The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.



(a) Write down the median lifetime of these LED bulbs. [1]

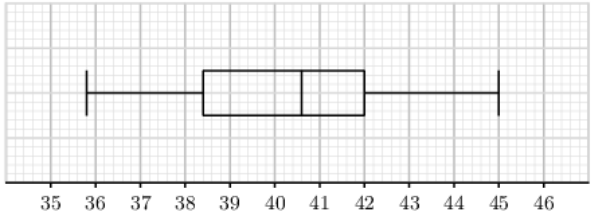
(b) Write down the upper quartile. [1]

(c) Find the interquartile range. [2]

The lifetimes of these LED bulbs are normally distributed.

(d) Find the longest lifetime of an LED bulb that is still not considered an outlier. [2]

The lifetime, in thousand of hours, of LED bulbs at a manufacture plant were recorded for a periodic quality check. The data is illustrated in the box-and-whisker diagram shown below.



(a) Write down the median lifetime of these LED bulbs. [1]

(b) Write down the upper quartile. [1]

(c) Find the interquartile range. [2]

The lifetimes of these LED bulbs are normally distributed.

(d) Find the longest lifetime of an LED bulb that is still not considered an outlier. [2]

$$\begin{aligned} Q_3 + 1.5 \times \text{IQR} &= 42\,000 + 1.5(3600) \\ &= 47\,400 \end{aligned}$$

Hence, the maximum lifetime for a LED bulb, whilst still not considered to be an outlier, is 47 400 hours.

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

(i) $r = 0.991$ [by using G.D.C.]

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

(ii) Hence comment on the result. [3]

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

(ii) Hence comment on the result. [3]

(ii) Strong, positive correlation between number of guests and revenue

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

(ii) Hence comment on the result. [3]

(b) Write down the equation of the regression line y on x. [1]

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

(ii) Hence comment on the result. [3]

(b) Write down the equation of the regression line y on x. [1]

(b) $y = 10.4x - 14.3$ [by using G.D.C.]

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

(ii) Hence comment on the result. [3]

(b) Write down the equation of the regression line y on x. [1]

(c) Use the equation of the regression line to estimate the revenue of serving 70 guests. Give your answer correct to **the nearest AUD**. [2]

(c) Evaluating $y = 10.4x - 14.3$ for $x = 70$, we get

$$y = 10.4(70) - 14.3$$

$$= 713.7$$

$$\approx 714 \text{ AUD}$$

The following table shows the total revenue, y, in Australian dollars (AUD), obtained daily during the first week of January 2020, by Peppy's Pizza restaurant and the number of guests, x, served.

Number of Guests (x)	45	54	39	51	89	83	90
Revenue in AUD (y)	410	516	423	558	906	843	940

(a) (i) Calculate the Pearson's product-moment correlation coefficient, r, for this data.

(ii) Hence comment on the result. [3]

(b) Write down the equation of the regression line y on x. [1]

(c) Use the equation of the regression line to estimate the revenue of serving 70 guests. Give your answer correct to **the nearest AUD**. [2]

(c) Evaluating $y = 10.4x - 14.3$ for $x = 70$, we get

$$y = 10.4(70) - 14.3$$

$$= 713.7$$

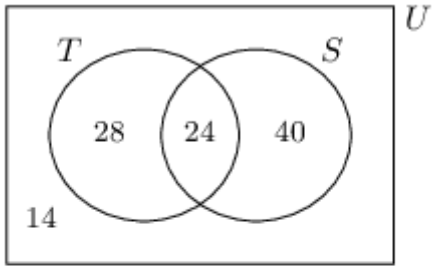
$$\approx 714 \text{ AUD}$$

106 runners at a marathon event were asked through which media channels they received information about the marathon. The summary shows that 52 runners answered "TV advertising", 64 answered "social media" and 14 answered "others". Find the probability that a runner selected at random from the marathon received information about the marathon through:

(a) both TV advertising and social media; [3]

106 runners at a marathon event were asked through which media channels they received information about the marathon. The summary shows that 52 runners answered "TV advertising", 64 answered "social media" and 14 answered "others". Find the probability that a runner selected at random from the marathon received information about the marathon through:

(a) both TV advertising and social media; [3]



$$\Pr(T \cap S) = \frac{24}{106}$$

$$\approx 0.226$$

106 runners at a marathon event were asked through which media channels they received information about the marathon. The summary shows that 52 runners answered "TV advertising", 64 answered "social media" and 14 answered "others". Find the probability that a runner selected at random from the marathon received information about the marathon through:

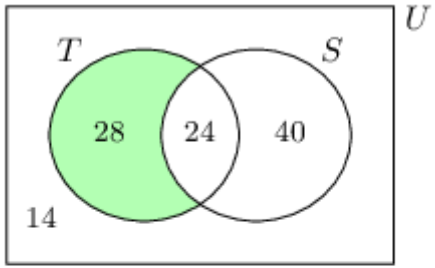
(a) both TV advertising and social media; [3]

(b) only TV advertising. [3]

106 runners at a marathon event were asked through which media channels they received information about the marathon. The summary shows that 52 runners answered "TV advertising", 64 answered "social media" and 14 answered "others". Find the probability that a runner selected at random from the marathon received information about the marathon through:

(a) both TV advertising and social media; [3]

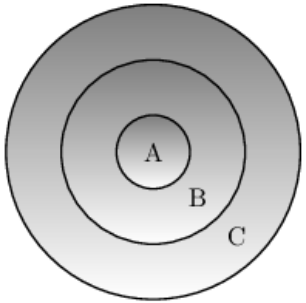
(b) only TV advertising. [3]



$$\Pr(T \cap S') = \frac{28}{106}$$

$$\approx 0.264$$

The following diagram shows an archery target which is divided into three regions A, B and C.



A contest consists of an archer shooting one arrow at the target. The probability of hitting each region is given in the following table.

Region	A	B	C
Probability	$\frac{1}{24}$	$\frac{4}{24}$	$\frac{7}{24}$

(a) Find the probability that the arrow does **not** hit the target. [2]

We have

$$\Pr(\text{A}) + \Pr(\text{B}) + \Pr(\text{C}) + \Pr(\text{Missed Target}) = 1$$

$$\frac{1}{24} + \frac{4}{24} + \frac{7}{24} + \Pr(\text{Missed Target}) = 1$$

$$\frac{12}{24} + \Pr(\text{Missed Target}) = 1$$

$$\boxed{\Pr(\text{Missed Target}) = \frac{1}{2}}$$

An archer scores points on the contest as shown in the following table.

Region	A	B	C	Missed Target
Points	10	6	k	-4

(b) Given that the contest is fair, find the value of k. [4]

An archer scores points on the contest as shown in the following table.

Region	A	B	C	Missed Target
Points	10	6	k	-4

(b) Given that the contest is fair, find the value of k. [4]

Let X be the number of points scored by an archer on the contest. Hence, using the formula for the expected value of X, we get

$$\mathrm{E}(X) = 0 \qquad \text{[fair contest]}$$

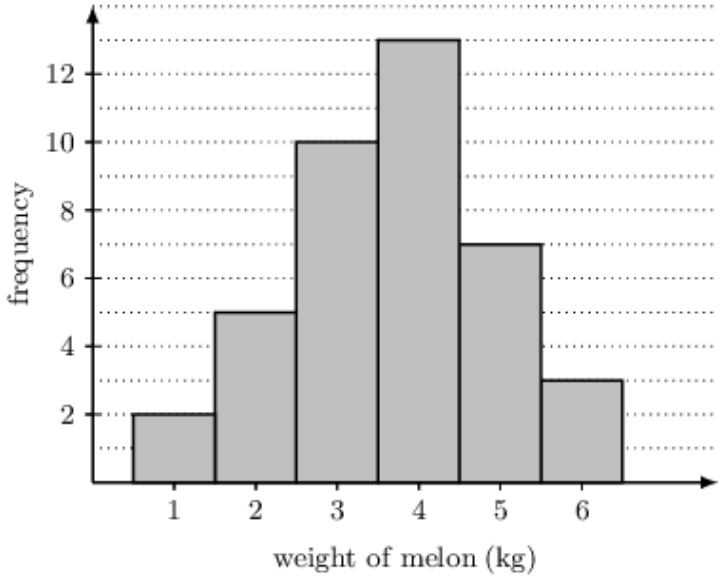
$$10 \times \frac{1}{24} + 6 \times \frac{4}{24} + k \times \frac{7}{24} + (-4) \times \frac{12}{24} = 0$$

$$\frac{10 + 24 + 7k - 48}{24} = 0$$

$$7k - 14 = 0$$

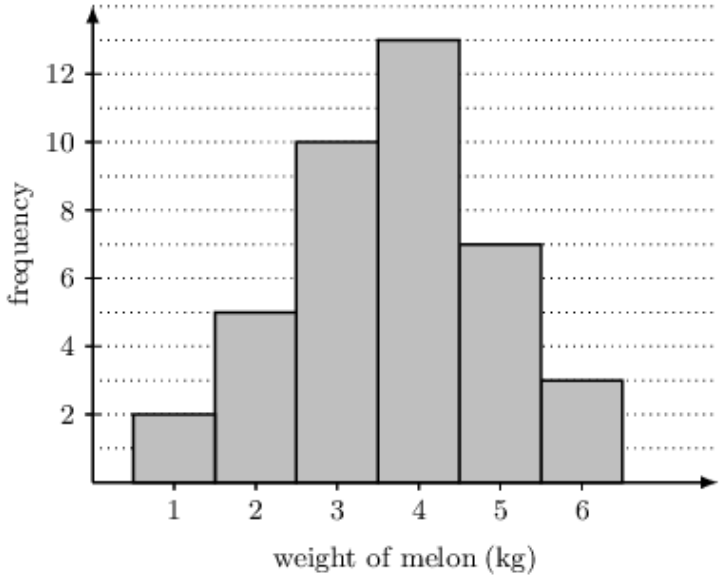
$$\boxed{k = 2}$$

The histogram below shows the weights of 40 Honeydew Melons, each measured correct to the nearest kg.



(a) Write down the modal weight of the melons. [1]

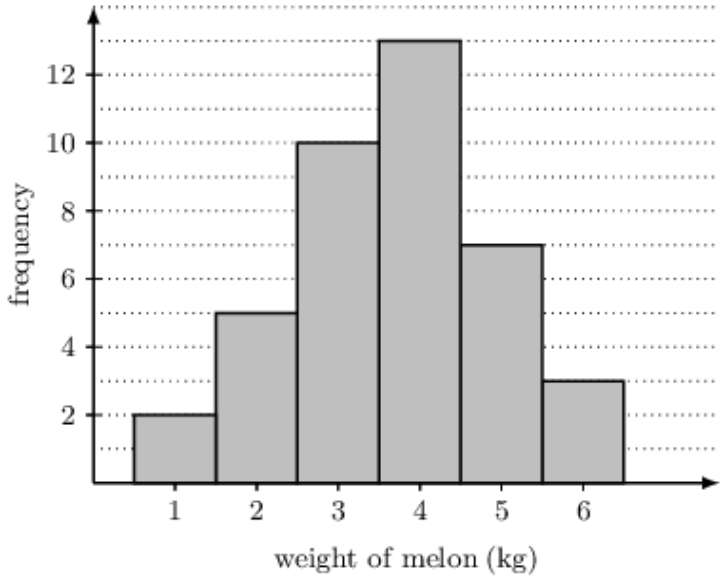
The histogram below shows the weights of 40 Honeydew Melons, each measured correct to the nearest kg.



(a) Write down the modal weight of the melons. [1]

Modal weight = 4 kg

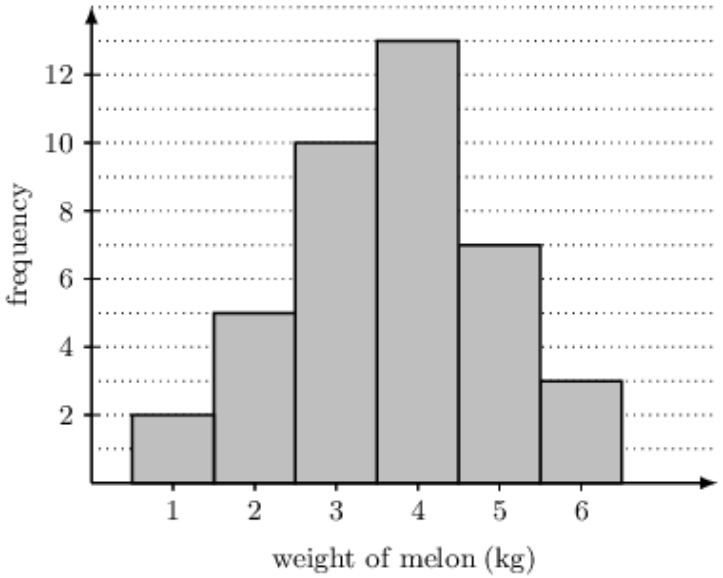
The histogram below shows the weights of 40 Honeydew Melons, each measured correct to the nearest kg.



(a) Write down the modal weight of the melons. [1]

(b) Find the median weight of the melons. [3]

The histogram below shows the weights of 40 Honeydew Melons, each measured correct to the nearest kg.



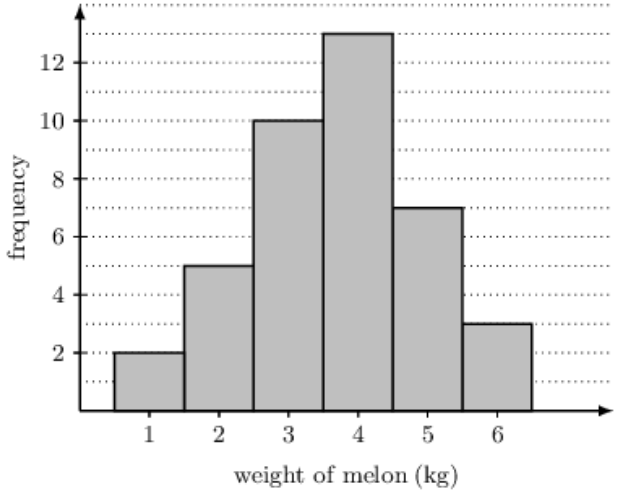
(a) Write down the modal weight of the melons.

(b) Find the median weight of the melons.

$$[\text{Median}] = \frac{1}{2}(40+1) \text{ th value}$$
$$= 20.5\text{th value}$$

Median weight $= 4$ kg.

The histogram below shows the weights of 40 Honeydew Melons, each measured correct to the nearest kg.



(a) Write down the modal weight of the melons. [1]

(b) Find the median weight of the melons. [3]

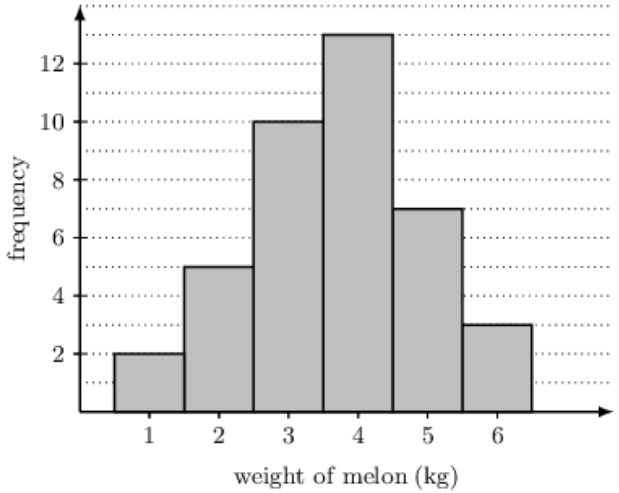
The lower quartile is 3 kg.

(c) Calculate

(i) the upper quartile;

(ii) the interquartile range. [2]

The histogram below shows the weights of 40 Honeydew Melons, each measured correct to the nearest kg.



(a) Write down the modal weight of the melons. [1]

(b) Find the median weight of the melons. [3]

The lower quartile is 3 kg.

$$Q_3 = \frac{4+5}{2}$$

$$= 4.5 \text{ kg}$$

$$\text{IQR} = Q_3 - Q_1$$

$$= 4.5 - 3$$

$$= 1.5$$

(c) Calculate

(i) the upper quartile;

(ii) the interquartile range. [2]

At the end of a working day, a survey was conducted at a company head office asking employees how frequently they take sick leave days per year.

The data is shown in the following table.

Number of sick leave days per year	2	3	4	5	6	7	8
Number of employees	12	22	24	15	k	3	1

(a) State whether the data is discrete or continuous. [1]

At the end of a working day, a survey was conducted at a company head office asking employees how frequently they take sick leave days per year.

The data is shown in the following table.

Number of sick leave days per year	2	3	4	5	6	7	8
Number of employees	12	22	24	15	k	3	1

(a) State whether the data is discrete or continuous. [1]

The data is discrete.

At the end of a working day, a survey was conducted at a company head office asking employees how frequently they take sick leave days per year.

The data is shown in the following table.

Number of sick leave days per year	2	3	4	5	6	7	8
Number of employees	12	22	24	15	k	3	1

(a) State whether the data is discrete or continuous. [1]

The mean number of sick leave days per year is 4.

(b) Find the value of k. [4]

At the end of a working day, a survey was conducted at a company head office asking employees how frequently they take sick leave days per year.

The data is shown in the following table.

Number of sick leave days per year	2	3	4	5	6	7	8
Number of employees	12	22	24	15	k	3	1

(a) State whether the data is discrete or continuous.

The mean number of sick leave days per year is 4.

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} f_i x_i.$$

(b) Find the value of k.

$$\begin{aligned} n &= 12 + 22 + 24 + 15 + k + 3 + 1 \\ &= 77 + k \\ \sum_{i=1}^{n} f_i x_i &= (2 \times 12) + (3 \times 22) + (4 \times 24) + (5 \times 15) + (6 \times k) + (7 \times 3) + (8 \times 1) \\ &= 290 + 6k \end{aligned}$$

$$\bar{x} = \frac{290 + 6k}{77 + k}$$

$$4 = \frac{290 + 6k}{77 + k}$$

$k = 9$ [by using G.D.C.]

At the end of a working day, a survey was conducted at a company head office asking employees how frequently they take sick leave days per year.

The data is shown in the following table.

Number of sick leave days per year	2	3	4	5	6	7	8
Number of employees	12	22	24	15	k	3	1

(a) State whether the data is discrete or continuous. [1]

The mean number of sick leave days per year is 4.

(b) Find the value of k. [4]

In this survey, these employees were arranged in alphabetical order and every 5th person was asked for the number of sick leaves per year.

(c) Identify the sampling technique used in the survey. [1]

At the end of a working day, a survey was conducted at a company head office asking employees how frequently they take sick leave days per year.

The data is shown in the following table.

Number of sick leave days per year	2	3	4	5	6	7	8
Number of employees	12	22	24	15	k	3	1

(a) State whether the data is discrete or continuous. [1]

The mean number of sick leave days per year is 4.

(b) Find the value of k. [4]

In this survey, these employees were arranged in alphabetical order and every 5th person was asked for the number of sick leaves per year.

(c) Identify the sampling technique used in the survey. [1]

Systematic sampling

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

$r \approx 0.92$

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

(b) Comment on the result found for r. [1]

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

(b) Comment on the result found for r. [1]

The correlation coefficient is positive and close to 1. We can conclude that there is a strong, positive linear relationship between waist circumference and length of the pants.

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

(b) Comment on the result found for r. [1]

The equation of the regression line is in the form $y = mx + c$.

(c) (i) Find the value of m and comment on its meaning.

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

(b) Comment on the result found for r. [1]

The equation of the regression line is in the form $y = mx + c$.

(c) (i) Find the value of m and comment on its meaning.

(i) Using G.D.C, we obtain the equation of the regression line below.

$$y = 0.787x + 41.097$$

$m = 0.787$. This means the length of a pant will increase by 0.787 cm for every additional 1 cm of waist circumference.

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

(b) Comment on the result found for r. [1]

The equation of the regression line is in the form $y = mx + c$.

(c) (i) Find the value of m and comment on its meaning.

(ii) Find the value of c and interpret its meaning if appropriate. If not appropriate, explain why. [4]

A clothes tailoring shop received an order for pants of different waist and length sizes. The made-to-order measurements for this order were recorded and are shown in the following table.

Waist circumference, cm (x)	80	82	79	60	65	92	90	81
Length, cm (y)	110	111	102	87	92	112	110	100

(a) Find the Pearson's product moment correlation coefficient, r, for this data. [2]

(b) Comment on the result found for r. [1]

The equation of the regression line is in the form $y = mx + c$.

(c) (i) Find the value of m and comment on its meaning.

(ii) Find the value of c and interpret its meaning if appropriate. If not appropriate, explain why. [4]

(ii) $c \approx 41.1$. It is not appropriate to interpret the meaning of c as the waist circumference (x) cannot be zero.

A mathematics teacher designed a new type of probability game to play with her students. In the game, a student draws two marbles at random from a bag in succession, with replacement. The bag contains 8 marbles: 1 red, 3 white, 2 blue and 2 green. The points scored for each coloured marble is shown in the table below.

Colour	Red	White	Blue	Green
Points scored	-2	0	2	4

The score the student receives in the game is the sum of the points from the two draws. This is illustrated by the sample space diagram shown below.

		First draw			
		Red	White	Blue	Green
Second draw	Red	-4	-2	0	$\boldsymbol{c}$
	White	-2	0	$\boldsymbol{c}$	4
	Blue	0	$\boldsymbol{c}$	4	6
	Green	$\boldsymbol{c}$	4	6	8

(a) Determine the value of c in the sample space diagram above. [1]

A mathematics teacher designed a new type of probability game to play with her students. In the game, a student draws two marbles at random from a bag in succession, with replacement. The bag contains 8 marbles: 1 red, 3 white, 2 blue and 2 green. The points scored for each coloured marble is shown in the table below.

Colour	Red	White	Blue	Green
Points scored	-2	0	2	4

The score the student receives in the game is the sum of the points from the two draws. This is illustrated by the sample space diagram shown below.

		First draw			
		Red	White	Blue	Green
Second draw	Red	-4	-2	0	c
	White	-2	0	c	4
	Blue	0	c	4	6
	Green	c	4	6	8

(a) Determine the value of c in the sample space diagram above. [1]

A student will score c points if they, as an example, draw a green ball (4) and then a red ball (-2). Hence, we get

$$c = 4 + (-2)$$

$$= 2$$

Lin plays the game once. Let the random variable L represent Lin's score.

(b) Using your answer in part (a), complete the missing column in the following probability distribution table for L. [3]

l	-4	-2	0		4	6	8
$\mathbf{Pr}(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$		$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

Lin plays the game once. Let the random variable L represent Lin's score.

(b) Using your answer in part (a), complete the missing column in the following probability distribution table for L. [3]

l	-4	-2	0		4	6	8
$\Pr(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$		$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

$$\begin{aligned}\Pr(2) &= \Pr(\text{green, red}) + \Pr(\text{red, green}) \\ &\quad + \Pr(\text{blue, white}) + \Pr(\text{white, blue}) \\ &= \left(\frac{2}{8} \cdot \frac{1}{8}\right) + \left(\frac{1}{8} \cdot \frac{2}{8}\right) + \left(\frac{2}{8} \cdot \frac{3}{8}\right) + \left(\frac{3}{8} \cdot \frac{2}{8}\right) \\ &= \frac{1}{4}\end{aligned}$$

l	-4	-2	0	2	4	6	8
$\Pr(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

(c) Find the probability that

(i) Lin scores at least 4.

l	-4	-2	0	2	4	6	8
$\mathbf{Pr}(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

(c) Find the probability that

(i) Lin scores at least 4.

l	-4	-2	0	2	4	6	8
$\Pr(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

$$\Pr(L \geq 4) = \Pr(L = 4) + \Pr(L = 6) + \Pr(L = 8)$$

$$= \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$$

$$= \frac{7}{16}$$

(ii) Lin scores exactly 6, given that she scores at least 4.

l	-4	-2	0	2	4	6	8
$\mathbf{Pr}(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

(ii) Lin scores exactly 6, given that she scores at least 4.

l	-4	-2	0	2	4	6	8
$\Pr(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

$$\Pr(L = 6 \mid L \geq 4) = \frac{\Pr(L = 6 \cap L \geq 4)}{\Pr(L \geq 4)}$$

$$= \frac{\frac{1}{8}}{\frac{7}{16}}$$

$$= \frac{2}{7}$$

(d) Find Lin's expected score in the game.

l	-4	-2	0	2	4	6	8
$\Pr(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

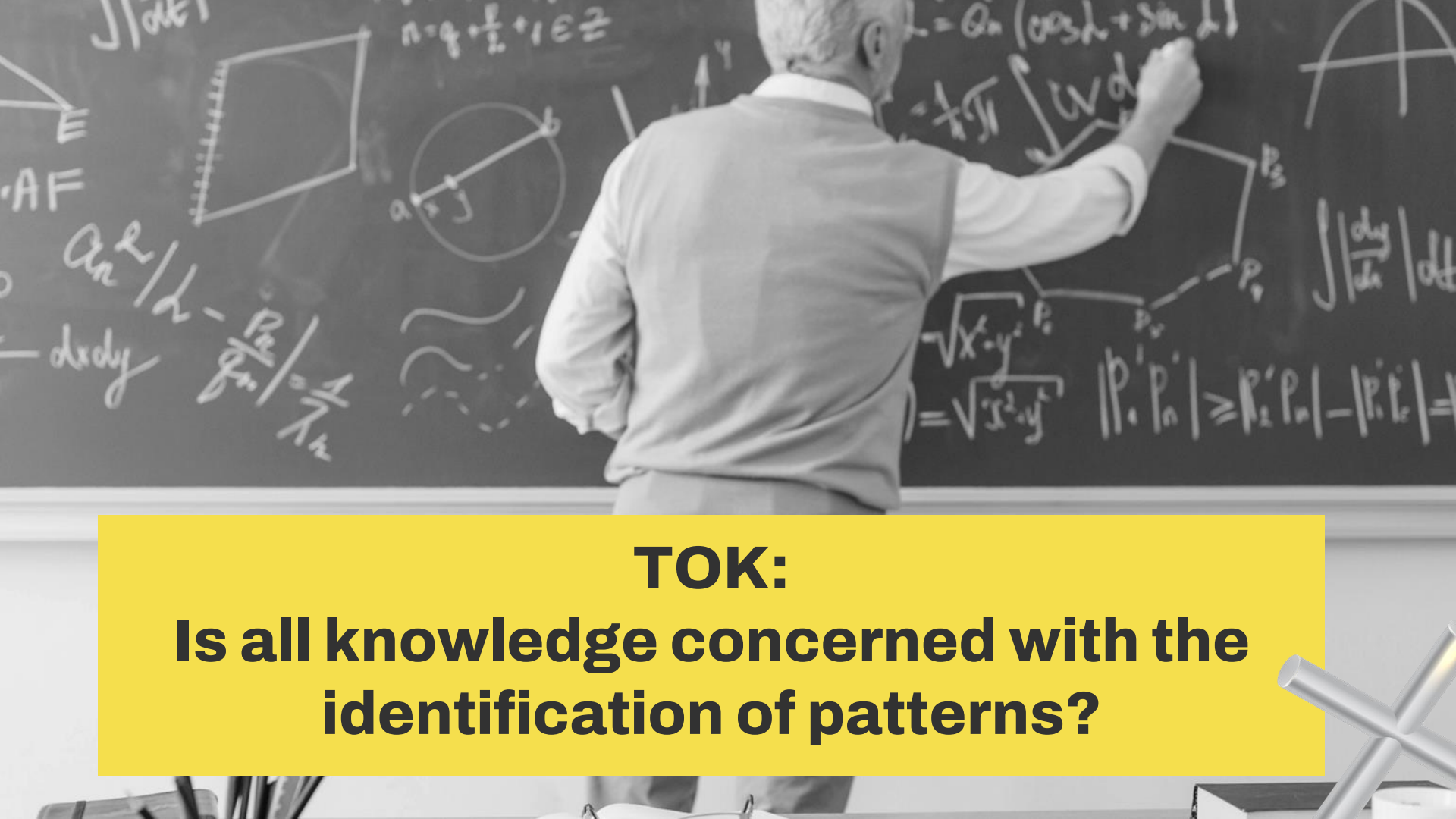
(d) Find Lin's expected score in the game.

l	-4	-2	0	2	4	6	8
$\Pr(L = l)$	$\frac{1}{64}$	$\frac{3}{32}$	$\frac{13}{64}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

$$\mathrm{E}[L] = \sum l_i \Pr(L = l_i)$$

$$= (-4) \times \frac{1}{64} + (-2) \times \frac{3}{32} + 0 \times \frac{13}{64} + 2 \times \frac{1}{4} + 4 \times \frac{1}{4} + 6 \times \frac{1}{8} + 8 \times \frac{1}{16}$$

$$= \frac{5}{2}$$



TOK:
Is all knowledge concerned with the identification of patterns?