

STATISTICS (Q 7, PAPER 2)

2005

- 7 (a) Calculate the weighted mean of 10, 30 and 15, given that the weights are 3, 1 and 2, respectively.
- (b) There are fourteen questions in an examination. The table below shows the performance of the candidates.

Correct responses	0 – 2	3 – 5	6 – 8	9 – 11	12 – 14
Number of candidates	1	2	6	8	3

- (i) Using mid-interval values, calculate the mean number of correct responses.
- (ii) Calculate the standard deviation, correct to one decimal place.
- (c) A concert began at 8.00 p.m. The cumulative frequency table below gives the number of people in the concert hall at the times stated.

Time p.m.	7.10	7.20	7.30	7.40	7.50	8.00
Number of people	0	30	100	160	275	300

- (i) Copy and complete the following frequency table to show the number of people who entered the hall during each time interval.

Time interval	7.10 – 7.20	7.20 – 7.30	7.30 – 7.40	7.40 – 7.50	7.50 – 8.00
Number of people					

- (ii) In which interval does the median time of arrival lie?
- (iii) In which time interval did the greatest number of people enter the concert hall?
- (iv) What is the least number of people who could have been in the concert hall at 7.15 p.m?

SOLUTION

7 (a)

$$\bar{w} = \frac{\sum wx}{\sum w} = \frac{90}{6} = 15$$

x	w	wx
10	3	30
30	1	30
15	2	30
	6	90

$$\bar{w} = \frac{\sum wx}{\sum w} \dots\dots \mathbf{3}$$

7 (b)

If you are asked to find the mean and standard deviation of a frequency distribution, set it out in a table as shown.

$$\bar{x} = \frac{f_1x_1 + f_2x_2 + \dots + f_Nx_N}{f_1 + f_2 + \dots + f_N} = \frac{\sum fx}{\sum f}$$

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x	f	fx	d	d^2	fd^2
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
	$\sum f$	$\sum fx$			$\sum fd^2$

$$\sigma = \sqrt{\frac{\sum fd^2}{\sum f}}$$

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Work out the mean first. Then work out d using $d = (x - \bar{x})$. Finally, calculate the standard deviation.

x	f	fx	d	d^2	fd^2
1	1	1	- 7.5	56.25	56.25
4	2	8	- 4.5	20.25	40.5
7	6	42	- 1.5	2.25	13.5
10	8	80	1.5	2.25	18.0
13	3	39	4.5	20.25	60.75
	20	170			189

Draw up a table in the way as shown on the left. The mid-interval values, x , are obtained by adding the class interval values together and dividing by two.

(i) $\bar{x} = \frac{\sum fx}{\sum f} = \frac{170}{20} = 8.5$

(ii) $\sigma = \sqrt{\frac{\sum fd^2}{\sum f}} = \sqrt{\frac{189}{20}} = 3.1$

7 (c) (i)

To work out each value subtract the numbers in the cumulative frequency table.

Time interval	7.10 – 7.20	7.20 – 7.30	7.30 – 7.40	7.40 – 7.50	7.50 – 8.00
Number of people	30	70	60	115	25

7 (c) (ii)

There are 50 minutes from 7.10 to 8.00. The median is the half-way point which occurs after 25 minutes which is a time of 7.35. This occurs in the interval 7.30 – 7.40.

7 (c) (iii)

Between 7.40 – 7.50 the greatest number of 115 people arrived.

7 (c) (iv)

30 people arrived between 7.10 – 7.20. It is possible that all 30 people arrived after 7.15. Therefore, the least number of people who could have been in the concert hall at 7.15 is zero people.