

## Statistics 1 Numerical Measures Questions

- 3 When an alarm is raised at a market town's fire station, the fire engine cannot leave until at least five fire-fighters arrive at the station. The call-out time,  $X$  minutes, is the time between an alarm being raised and the fire engine leaving the station.

The value of  $X$  was recorded on a random sample of 50 occasions. The results are summarised below, where  $\bar{x}$  denotes the sample mean.

$$\sum x = 286.5 \quad \sum (x - \bar{x})^2 = 45.16$$

- (a) Find values for the mean and standard deviation of this sample of 50 call-out times. *(2 marks)*
- (b) Hence construct a 99% confidence interval for the mean call-out time. *(4 marks)*
- (c) The fire and rescue service claims that the station's mean call-out time is less than 5 minutes, whereas a parish councillor suggests that it is more than  $6\frac{1}{2}$  minutes.
- Comment on **each** of these claims. *(2 marks)*
- 

- 4 The time,  $x$  seconds, spent by each of a random sample of 100 customers at an automatic teller machine (ATM) is recorded. The times are summarised in the table.

Time (seconds)	Number of customers
$20 < x \leq 30$	2
$30 < x \leq 40$	7
$40 < x \leq 60$	18
$60 < x \leq 80$	27
$80 < x \leq 100$	23
$100 < x \leq 120$	13
$120 < x \leq 150$	7
$150 < x \leq 180$	3
<b>Total</b>	<b>100</b>

- (a) Calculate estimates for the mean and standard deviation of the time spent at the ATM by a customer. *(4 marks)*
-

(b) Kirk attends darts coaching sessions for three months. He then claims that he has a probability of 0.4 of winning any game, and that the outcome of each game is independent of the outcome of every other game.

(i) Assuming this claim to be true, calculate the mean and standard deviation for the number of games won by Kirk in a match of 15 games. *(3 marks)*

(ii) To assess Kirk's claim, Les keeps a record of the number of games won by Kirk in a series of 10 matches, each of 15 games, with the following results:

8   5   6   3   9   12   4   2   6   5

Calculate the mean and standard deviation of these values. *(2 marks)*

(iii) Hence comment on the validity of Kirk's claim. *(3 marks)*

---

1 The times, in seconds, taken by 20 people to solve a simple numerical puzzle were

17   19   22   26   28   31   34   36   38   39  
41   42   43   47   50   51   53   55   57   58

(a) Calculate the mean and the standard deviation of these times. *(3 marks)*

(b) In fact, 23 people solved the puzzle. However, 3 of them failed to solve it within the allotted time of 60 seconds.

Calculate the median and the interquartile range of the times taken by all 23 people. *(4 marks)*

(c) For the times taken by all 23 people, explain why:

(i) the mode is **not** an appropriate numerical measure;

(ii) the range is **not** an appropriate numerical measure. *(2 marks)*

---

- 4 A library allows each member to have up to 15 books on loan at any one time.

The table shows the numbers of books currently on loan to a random sample of 95 members of the library.

<b>Number of books on loan</b>	0	1	2	3	4	5–9	10–14	15
<b>Number of members</b>	4	13	24	17	15	11	5	6

- (a) For these data:
- (i) state values for the mode and range; *(2 marks)*
  - (ii) determine values for the median and interquartile range; *(4 marks)*
  - (iii) calculate estimates of the mean and standard deviation. *(4 marks)*
- (b) Making reference to your answers to part (a), give a reason for preferring:
- (i) the median and interquartile range to the mean and standard deviation for summarising the given data; *(1 mark)*
  - (ii) the mean and standard deviation to the mode and range for summarising the given data. *(1 mark)*
-