

Exercise walk-through

Summary Statistics for a Quantitative Variable ■ 1.7

eXercise

You must be able to

- calculate the **mean** 均值 $\bar{x}$ and the **median** 中位数
- calculate the **range**, **interquartile range** 四分位距 $IQR = Q_3 - Q_1$, and **standard deviation** 标准差 s_x
- explain why the median and IQR are **resistant** 稳健 to outliers

Method — Measures of center

- **Mean** $\bar{x} = \frac{\sum x}{n}$.
- **Median** — the middle value when the data are ordered.

Method — Measures of spread

- **Range** = $\max - \min$.
- **IQR** = $Q_3 - Q_1$.
- **Standard deviation** s_x — the typical distance from the mean.

Method — Resistance

The **median** and **IQR** are **resistant** to outliers; the **mean** and **standard deviation** are **not**.

Practice 2.1 ■ 2 marks

Find the mean of $\{3, 5, 7, 9\}$.

Solution 2.1

Worked steps

$$\bar{x} = \frac{3 + 5 + 7 + 9}{4} = \frac{24}{4} = 6 \quad \text{M1} \quad \text{A1}.$$

Practice 2.2 ■ 2 marks

Find the median of $\{2, 6, 4, 8, 10\}$.

Solution 2.2

Worked steps

ordered: 2, 4, 6, 8, 10; the middle value is 6 **M1** **A1**.

Practice 2.3 ■ 1 mark

State which measures of center and spread resist outliers.

Solution 2.3

Worked steps

the median (center) and the IQR (spread) **B1**.

Exam-style 3.1 ■ 1 mark

The interquartile range equals

A $\text{max} - \text{min}$

B $Q_3 - Q_1$

C $\text{mean} - \text{median}$

D $Q_1 - Q_3$

Solution 3.1

A $\text{max} - \text{min}$

B $Q_3 - Q_1$



C $\text{mean} - \text{median}$

D $Q_1 - Q_3$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

Which of these is resistant to outliers?

A the mean

B the standard deviation

C the median

D the range

Solution 3.2

Method: Resistance

- A the mean
- B the standard deviation
- C the median
- D the range



Worked steps

C.

Exam-style 3.3 ■ 2 marks

For the data $\{4, 8, 6, 10, 12\}$:

- (a) find the mean.
- (b) find the median.
- (c) find the range.

Solution 3.3

Method: Measures of center

Worked steps

(a) $\frac{4 + 8 + 6 + 10 + 12}{5} = \frac{40}{5} = 8$ **M1** **A1**. (b) ordered 4, 6, 8, 10, 12 $\rightarrow$ median 8 **B1**. (c) $12 - 4 = 8$ **B1**.