AP STATISTICS • EXERCISE SHEET

1.7 Summary Statistics for a Quantitative Variable

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

KEY WORDS mean 均值 • median 中位数 • standard deviation 标准差 • resistant 稳健 • interquartile range 四分位距

Objective

Build the skills to answer exam questions on **summary statistics for a quantitative variable**.

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 $\text{IQR} = Q_3 - Q_1$, and **standard deviation** 标准差 s_x
- explain why the median and IQR are **resistant** 稳健 to outliers

1 Worked examples

Study these first. Each one shows the method for a question type used later.

Measures of center

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

Measures of spread

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

Resistance

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

2 Practice

2.1 Find the mean of $\{3, 5, 7, 9\}$. [2]

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

2.3 State which measures of center and spread resist outliers. [1]

3 Exam-style questions

3.1 The interquartile range equals [1]

- **A** max $-$ min
- **B** $Q_3 - Q_1$
- **C** mean $-$ median
- **D** $Q_1 - Q_3$

3.2 Which of these is resistant to outliers? [1]

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

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

(a) find the mean. [2]

(b) find the median. [1]

(c) find the range. [1]

Solutions

2.1 $\bar{x} = \dfrac{3+5+7+9}{4} = \dfrac{24}{4} = 6.$

2.2 ordered: $2, 4, 6, 8, 10$; the middle value is 6.

2.3 the median (center) and the IQR (spread).

3.1 B.

3.2 C.

3.3 (a) $\dfrac{4+8+6+10+12}{5} = \dfrac{40}{5} = 8.$ (b) ordered $4, 6, 8, 10, 12 \to$ median 8. (c) $12 - 4 = 8.$