Quartiles and five-number summaries

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Order 9, 4, 7, 2, 6, 8, 3, 5 and find their median. [2 marks]

There are 8 values.

Average the fourth and fifth values: $\frac{5+6}{2} = 5.5$.

Answer: Order 2, 3, 4, 5, 6, 7, 8, 9; median 5.5.

2. Find Q_1 and Q_3 for 2, 3, 4, 5, 6, 7, 8, 9. [2 marks]

Lower half 2, 3, 4, 5 gives $\frac{3+4}{2}$.

Upper half 6, 7, 8, 9 gives $\frac{7+8}{2}$.

Answer: $Q_1 = 3.5$; $Q_3 = 7.5$.

3. Give the five-number summary for 5, 7, 8, 10, 12, 13, 16. [2 marks]

Median 10 is excluded from halves.

Lower-half median 7; upper-half median 13.

Answer: 5, 7, 10, 13, 16.

4. Give the five-number summary for 1, 2, 2, 3, 3, 4, 5, 8. [2 marks]

$\text{Median} = \frac{3+3}{2} = 3.$

Lower half median 2; upper half median $\frac{4+5}{2} = 4.5.$

Answer: 1, 2, 3, 4.5, 8.

5. A reported summary is 4, 12, 9, 18, 25. Explain the problem. [2 marks]

Five-number summaries must be nondecreasing.

Quartile positions cannot reverse the ordering.

Answer: $Q_1 = 12$ exceeds the median 9, so the summary is invalid.

6. Software reports $Q_1 = 4.25$ where median-of-halves gives 4.5. What should you check before claiming an error? [2 marks]

Several interpolation rules are used for quartiles.

Compare results only after matching data and convention.

Answer: Check the quartile convention and the entered data.