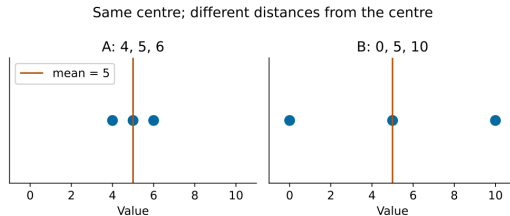


Distributions, transformations and spread

Original skill preparation; versioned source scope

Method and conditions



- A frequency counts repeated observations.
- Ordered data; frequency; mean and median.

Worked method 1

Read and reason

A frequency counts repeated observations. Values 1, 3, 7 with frequencies 2, 1, 1 represent four observations: 1, 1, 3, 7. $\bar{x} = \sum fx / \sum f = (2(1) + 1(3) + 1(7))/4 = 3$. The median is $(1 + 3)/2 = 2$; it need not equal the mean.

Original context 1

Read and reason

Task context

Read and reason

Each task below states its own complete data. Values may differ from the worked example.

Attempt 1.1

Read and reason

Values 2, 5, 8 have frequencies 3, 2, 1. Find mean, median and range.

Reasoning 1.1

Read and reason

Data are 2,2,2,5,5,8. $\bar{x} = (3(2) + 2(5) + 1(8))/6 = 4$. Median is the average of positions 3 and 4, $(2 + 5)/2 = 3.5$. Range $R = 8 - 2 = 6$.

Attempt 2.1

Read and reason

Every observation above is changed by $z = 3x - 4$. Find the new mean, median and range. State how standard deviation changes without computing it.

Reasoning 2.1

Read and reason

Mean $\bar{z} = 3\bar{x} - 4 = 3(4) - 4 = 8$. Median is $3(3.5) - 4 = 6.5$. Range is $3(6) = 18$. Standard deviation triples; subtracting 4 changes no distance from the mean.

Attempt 3.1

Read and reason

Compare $A = \{0, 0, 10, 10\}$ and $B = \{0, 5, 5, 10\}$. Both have range 10. Must their standard deviations agree? Justify.

Reasoning 3.1

Read and reason

Both means are 5. Every A observation is 5 from its mean; B distances are 5,0,0,5. B therefore has smaller mean squared deviation and smaller standard deviation. Equal range alone is insufficient.

Transfer and limits

Read and reason

Ordered data; frequency; mean and median.

Check yourself

Read and reason

Close the worked reasoning. Explain why the method fits the final transfer task, reconstruct its conclusion, and state a condition that would change your answer. Then check the full reasoning in the reference.