

Q1: Understanding Central Tendency (Easy)

A bakery tracks the daily sales of muffins (in dozens) over a week: [10, 12, 11, 15, 14, 13, 12]. What is the most representative value of their weekly sales, and why?

Answer:

Most Representative Value: Mean (Average) Sales

Given data (in dozens):

10, 12, 11, 15, 14, 13, 12,

Step 1: Mean (Average)

$$\text{Mean} = \frac{10+12+11+15+14+13+12}{7} = \frac{87}{7} \approx 12.43$$

Step 2: Median

Arrange data: 10, 11, 12, 12, 13, 14, 15

Median (middle value) = 12

Step 3: Mode

Most frequent value = 12

Conclusion (Answer):

The mean (≈ 12.4 dozens) is the most representative value of weekly sales because it considers all daily sales values and gives an overall picture of average performance.

Although the median and mode are 12, the mean better reflects the overall trend across the entire week when there are no extreme outliers.

Q2: Mean in Real Life (Easy)

A teacher records the marks of her students in a short quiz: [12, 15, 14, 16, 18, 20, 19]. What is the mean score, and what does it tell us about the class's performance?

Answer:

Mean Score and Its Interpretation

Given marks:

12, 15, 14, 16, 18, 20, 19

Step 1: Calculate the Mean

$$\text{Mean} = \frac{12+15+14+16+18+20+19}{7} = \frac{114}{7} \approx 16.29$$

Answer:

- Mean score ≈ 16.3 marks

What it tells us about the class's performance:

The mean score shows that, on average, students scored around 16 marks in the quiz. This indicates good overall performance of the class, as most students scored close to this value, with no extremely low marks pulling the average down.

Q3: Mode in Real Life (Easy)

A store records the shoe sizes sold in one day: [7, 8, 9, 8, 8, 10, 7, 9]. What is the mode, and why is this information useful for the store manager?

Answer:**Mode and Its Practical Importance**

Given shoe sizes sold:

7,8,9,8,8,10,7,9

Step 1: Identify Frequencies

- Size 7 → 2 times
- Size 8 → 3 times
- Size 9 → 2 times
- Size 10 → 1 time

Answer:

- Mode = 8

Why this information is useful for the store manager:

The mode tells us the most frequently sold shoe size. Since size 8 is sold the most, the store manager can stock more shoes of size 8 to meet customer demand, reduce the risk of running out, and improve sales efficiency.

Q4: Median in Real Life (Medium)

A car dealer notes the prices of used cars: [\$8,000, \$9,500, \$10,200, \$11,000, \$50,000]. Why is the median a better measure than the mean in this case? Calculate the median.

Answer:

Why Median Is Better Than Mean and Its Calculation

Given car prices:

\$8,000, \$9,500, \$10,200, \$11,000, \$50,000

Step 1: Arrange the data

The prices are already in ascending order.

Step 2: Calculate the Median

Since there are 5 values (odd number), the median is the middle value.

Median = \$10,200

Why the median is a better measure than the mean:

The value \$50,000 is an extreme outlier compared to the other car prices. This very high price would pull the mean upward, giving a misleading impression that cars are generally more expensive.

The median is not affected by extreme values, so it better represents the typical price of used cars.

Q5: Dispersion Introduction (Medium)

A student times how long it takes to finish a puzzle each day: [25, 30, 27, 35, 40]. What does the range tell us about the variation in the student's puzzle-solving time?

Answer:

Understanding Range and What It Shows

Given puzzle-solving times (in minutes):

25,30,27,35,40

Step 1: Find the Range

Range = Maximum value–Minimum value

$$= 40 - 25 = 15 \text{ minutes}$$

What the range tells us:

The range shows the spread or variation in the student's puzzle-solving time. A range of 15 minutes means there is a significant difference between the fastest day (25 minutes) and the slowest day (40 minutes). This indicates that the student's performance varies noticeably from day to day.

Q6: Range in Action (Medium)

A farmer records the weekly weight of harvested apples (kg): [100, 105, 98, 110, 120]. Find the range. How can this help the farmer in planning his packaging?

Answer:

Range Calculation and Its Practical Use

Given weekly apple harvest weights (kg):

100, 105, 98, 110, 120

Step 1: Find the Range

$$\begin{aligned}\text{Range} &= \text{Maximum} - \text{Minimum} \\ &= 120 - 98 = 22 \text{ kg}\end{aligned}$$

Answer:

- Range = 22 kg

How this helps the farmer in packaging planning:

The range shows the variation in weekly harvest quantity. A range of 22 kg means the harvest can fluctuate significantly. Knowing this, the farmer can:

- Arrange flexible packaging capacity
- Avoid shortages or excess packaging materials
- Plan storage and transport more efficiently

Q7: Variance for Decision-Making (Medium)

Two delivery companies track delivery delays (in minutes). Company A: variance = 6 Company B: variance = 15 Which company is more consistent, and why?

Answer:

Consistency Based on Variance

Company A is more consistent.

Reason:

Variance measures how much the delivery times vary from the average.

- Company A has a variance of 6, which is lower
- Company B has a variance of 15, which is higher

A lower variance means delivery delays are more tightly clustered around the mean, showing more stable and predictable performance.

Q8: Standard Deviation in Context (Hard)

A finance student compares the daily price fluctuations of two cryptocurrencies

. Coin A: standard deviation = \$30

. Coin B: standard deviation = \$120

Which coin is riskier to invest in, and why?

Answer:

Coin B is riskier to invest in.

Reason:

Standard deviation measures the volatility or spread of price movements around the average price.

- Coin A has a standard deviation of \$30, indicating smaller daily price fluctuations
- Coin B has a standard deviation of \$120, indicating much larger fluctuations

A higher standard deviation means greater uncertainty and risk, as prices can change sharply in a short time.

Q9: Combining Measures (Hard)

A family records their monthly electricity usage (in kWh): [400, 420, 390, 450, 410]

Find the mean and standard deviation. What do these values together tell you about the family's energy use pattern?

Answer:

Mean, Standard Deviation, and Interpretation

Given monthly electricity usage (kWh):

400, 420, 390, 450, 410

Step 1: Calculate the Mean

$$\text{Mean} = \frac{400+420+390+450+410}{5} = \frac{2070}{5} = 414 \text{ kWh}$$

Step 2: Calculate the Standard Deviation

Deviations from the mean (414):

- $400 - 414 = -14$
- $420 - 414 = 6$
- $390 - 414 = -24$
- $450 - 414 = 36$
- $410 - 414 = -4$

Squares of deviations:

- 196, 36, 576, 1296, 16

Variance (population):

$$\frac{196+36+576+1296+16}{5} = \frac{2120}{5} = 424$$

Standard Deviation:

$$\sqrt{424} \approx 20.6 \text{ kWh}$$

Answer:

- Mean = 414 kWh
 - Standard Deviation ≈ 20.6 kWh
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What these values tell us together:

- The mean (414 kWh) represents the family's average monthly electricity consumption.
- The standard deviation (≈ 20.6 kWh) is relatively small compared to the mean, indicating that electricity usage is fairly consistent from month to month, with no extreme fluctuations.

Q10: Practical Application (Hard)

A basketball player's points in 8 games are recorded: [15, 18, 20, 22, 25, 17, 19, 21]. Find the mean, median, mode, range, and standard deviation. What insights can these measures provide about the player's scoring performance?

Answer:

Given points scored (8 games):

15, 18, 20, 22, 25, 17, 19, 21

1. Mean (Average)

$$\text{Mean} = \frac{15+18+20+22+25+17+19+21}{8} = \frac{157}{8} = 19.63$$

Mean \approx 19.6 points

2. Median

Arrange data in ascending order:

15, 17, 18, 19, 20, 21, 22, 25

Median = average of 4th and 5th values

$$\frac{19+20}{2} = 19.5$$

3. Mode

All values occur only once.

Mode: None

4. Range

$$\text{Range} = 25 - 15 = 10 \text{ points}$$

5. Standard Deviation (Population)

- Mean = 19.63

- Variance ≈ 8.61

Standard Deviation = $\sqrt{8.61} \approx 2.94$ points

Summary of Measures

- Mean: ≈ 19.6
 - Median: 19.5
 - Mode: None
 - Range: 10
 - Standard Deviation: ≈ 2.9
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Insights About the Player's Performance

- The mean and median are very close, indicating a balanced and consistent scoring pattern.
- The absence of a mode shows there is no repetitive fixed score; performance varies naturally.
- The range (10 points) suggests moderate variation between the lowest and highest scoring games.
- The low standard deviation (~ 2.9) indicates the player scores consistently close to the average, with no extreme highs or lows.