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 - Given data (in dozens):
[10, 12, 11, 15, 14, 13, 12]

1. Mean (Average)

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

2. Median (Middle Value)

First, arrange the data in order:
[10, 11, 12, 12, 13, 14, 15]
The middle value is **12**.

3. Mode (Most Frequent Value)

The value **12** appears most often.
So, **Mode = 12**.

The **most representative value** of weekly muffin sales is **12 dozens**.

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

The quiz marks are:
[12, 15, 14, 16, 18, 20, 19]

Step 1: Calculate the Mean (Average)

Add all the marks:

$$12+15+14+16+18+20+19=114$$

Total number of students = **7**

$$\text{Mean}=\frac{114}{7}\approx 16.29$$

The **mean score is approximately 16.3 marks**.

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

The shoe sizes sold are:
[7, 8, 9, 8, 8, 10, 7, 9]

Count each shoe size

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

  The **mode is shoe size 8**, because it is sold the most.

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

The used car prices are:
[$8,000, $9,500, $10,200, $11,000, $50,000]

Arrange the data

The prices are already in ascending order.

Find the Median

There are **5 values** (an odd number), so the median is the **middle value**.

Median = $10,200

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

The puzzle-solving times (in minutes) are:
[25, 30, 27, 35, 40]

Step 1: Find the Range

- **Maximum time** = 40 minutes
- **Minimum time** = 25 minutes

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

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

The weekly harvested apple weights (in kg) are:
[100, 105, 98, 110, 120]

Step 1: Find the Range

- **Maximum weight** = 120 kg
- **Minimum weight** = 98 kg

$$\text{Range} = 120 - 98 = 22 \text{ kg}$$

The **range is 22 kg**.

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

Two delivery companies report the following variances in delivery delays:

- **Company A:** Variance = **6**
- **Company B:** Variance = **15**

Which company is more consistent?

Company A is more consistent.

Why?

- **Variance measures how spread out the data is** from the average.
- A **lower variance** means the delivery delays are **closer to the mean**.
- Company A's variance (6) is much lower than Company B's (15), so its delays are **more predictable and stable**.
- Company B's higher variance means **greater fluctuation** in delivery times.

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

A finance student compares daily price fluctuations of two cryptocurrencies:

- **Coin A:** Standard deviation = **$30**
- **Coin B:** Standard deviation = **$120**

Which coin is riskier?

Coin B is riskier to invest in.

Why?

- **Standard deviation measures volatility**, or how much prices fluctuate around the average.
- A **higher standard deviation** means prices change more widely and unpredictably.
- Coin B's standard deviation ($120) is **four times higher** than Coin A's ($30), indicating **large daily price swings**.
- Large fluctuations increase the chance of **big gains but also big losses**, which raises investment risk.

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

The monthly electricity usage (in kWh) is:
[400, 420, 390, 450, 410]

Mean (Average)

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

Mean usage = 414 kWh

Standard Deviation (Spread)

First, find how far each value is from the mean (414), then square and average them.

Deviations:

- 400 → −14
- 420 → +6
- 390 → −24
- 450 → +36
- 410 → −4

Squared deviations:
196, 36, 576, 1296, 16 → **Sum = 2120**

- **Population standard deviation** (treating these as all months considered):

$$\sqrt{\frac{2120}{5}} \approx \sqrt{424} \approx 20.6 \text{ kWh}$$

(If treated as a sample, SD ≈ **23.0 kWh**.)

Standard deviation ≈ 21 kWh (about)

What do these values together tell us?

- The **mean (414 kWh)** shows the family's **typical monthly electricity use**.
- The **standard deviation (~21 kWh)** shows that usage usually varies **only a little** around the average.
- Most months are close to 414 kWh, with **no extreme spikes or drops**.

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

The basketball player's points across 8 games are:
[15, 18, 20, 22, 25, 17, 19, 21]

First, sort the data (helps with median):
[15, 17, 18, 19, 20, 21, 22, 25]

Calculations

Mean (Average)

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

Mean ≈ 19.6 points

Median

There are 8 values, so median is the average of the 4th and 5th values:

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

👉 **Median = 19.5 points**

Mode

All values occur only once.

Mode = None

Range

$$25 - 15 = 10$$

Range = 10 points

Standard Deviation

- **Population SD ≈ 2.9 points**
  (Sample SD would be ≈ **3.1 points**)

Standard deviation ≈ 3 points

What do these measures tell us?

- **Mean (19.6)** → The player typically scores about **20 points per game**.
- **Median (19.5)** → Confirms that scoring is centered around 19–20 points.
- **No mode** → The player does not rely on one fixed score; performance varies naturally.
- **Range (10)** → Difference between worst and best games is reasonable, not extreme.
- **Standard deviation (~3)** → Scores are **fairly consistent**, usually within ±3 points of the average.