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?

Ans.

The **most representative value** of the bakery's weekly muffin sales is **about 12 dozen muffins**.

Why:

- The data are: 10, 12, 11, 15, 14, 13, 12
  Sorted: 10, 11, 12, 12, 13, 14, 15
- **Median = 12** (the middle value), which represents a typical day.
- **Mode = 12** (the most frequent value).
- **Mean ≈ 12.4**, which is close to 12.

Because there are **no extreme outliers** and both the median and mode are 12, **12 dozen muffins** best represents a typical day's sales.

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?

Ans.

The **mean (average) score** is calculated by adding all the marks and dividing by the number of students.

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

Sum = 12 + 15 + 14 + 16 + 18 + 20 + 19 = **114**
Number of students = **7**

Mean = 114 ÷ 7 ≈ 16.3

What this tells us:
The average score of about **16** means that, overall, the class performed **fairly well** on the quiz. Most students scored around the mid-to-high range, indicating a generally strong understanding of the material.

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?

Ans.

The **mode** is the value that appears **most frequently**.

Shoe sizes sold: 7, 8, 9, 8, 8, 10, 7, 9

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

Mode = 8

Why this is useful:
Knowing that **size 8** is the most commonly sold helps the store manager:

- Stock more shoes in size 8
- Reduce the risk of running out of popular sizes
- Manage inventory more efficiently and meet customer demand

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.

Ans.

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

Median

Since there are **5 prices**, the median is the **middle value**:

Median = $10,200

Why the median is better than the mean

The price **$50,000** is much higher than the others and is an **outlier**.
If we used the mean, this very expensive car would pull the average upward and make it seem like used cars usually cost much more than they really do.

The **median** is not affected by extreme values, so **$10,200** better represents the typical price of a used car at this dealership.

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?

Ans.

The **range** measures how spread out the data are. It is calculated as:

Range = Maximum − Minimum

Times (in minutes): 25, 30, 27, 35, 40

- Minimum = 25
- Maximum = 40

Range = 40 − 25 = 15 minutes

What this tells us

The range of **15 minutes** shows that the student's puzzle-solving time varies quite a bit from day to day. Some days the puzzle is finished much faster, while on other days it takes significantly longer, indicating noticeable variation in performance.

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?

Ans.

Weekly harvests (kg): 100, 105, 98, 110, 120

- **Maximum = 120 kg**

- **Minimum = 98 kg**

Range

Range = 120 − 98 = 22 kg

How this helps the farmer

The range of **22 kg** shows how much the harvest can vary from week to week. This helps the farmer:

- Plan flexible packaging sizes
- Prepare for both smaller and larger harvests
- Avoid wasting packaging materials or running short in weeks with higher yields

Understanding the range supports better planning and efficiency.

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?

Ans.

Company A is more consistent.

Why:
Variance measures how spread out the delivery delays are from the average delay. A **smaller variance** means the delays are more tightly clustered around the mean.

- Company A: variance = **6** (less spread)

- Company B: variance = **15** (more spread)

Since Company A has a **lower variance**, its delivery times are more predictable and consistent than Company B's.

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?

Ans.

Coin B is riskier to invest in.

Why:
Standard deviation measures how much prices typically fluctuate around the average price. A **higher standard deviation** means larger and more frequent price swings.

- **Coin A:** standard deviation = $30 → relatively stable

- **Coin B:** standard deviation = $120 → much larger price fluctuations

Because Coin B’s price varies much more from day to day, it is **less predictable** and therefore **riskier** for an investor compared to Coin A.

Q9: Combining Measures (Hard) A family records their monthly electricity usage (in kWh): [400, 420, 390, 450, 410]. Assignment Questions Pwskills Find the mean and standard deviation. What do these values together tell you about the family’s energy use pattern?

Ans.

First, list the data:

Monthly electricity usage (kWh): **400, 420, 390, 450, 410**

Mean (Average)

Add all values and divide by 5:

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

So, the **mean usage is 414 kWh** per month.

Standard Deviation

Step 1: Find deviations from the mean (414)

- $400 - 414 = -14$
- $420 - 414 = 6$
- $390 - 414 = -24$

- 450 − 414 = 36
- 410 − 414 = −4

Step 2: Square the deviations

- 196, 36, 576, 1296, 16

Step 3: Find the average of squared deviations

[196 + 36 + 576 + 1296 + 16}/{5} = 2120}/{5} = 424

Step 4: Take the square root

{Standard Deviation}=20.6 \kWh

Interpretation

- The **mean (414 kWh)** shows the family's typical monthly electricity use.
- The **standard deviation (≈ 21 kWh)** is relatively small compared to the mean.

Together, these values tell us that the family's electricity usage is **fairly consistent from month to month**, with only moderate variation around their average consumption.

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?

Ans.

First, sort the data:
15, 17, 18, 19, 20, 21, 22, 25

Mean (Average)

Total points = 157
Number of games = 8

Mean=1578=19.6 points (approx.)Mean=8157=19.6 points (approx.)

Median

With 8 values, the median is the average of the 4th and 5th values:

Median=19+20/2=19.5

Mode

There is **no mode**, since no score repeats.

Range

Range=25−15=10 points

Standard Deviation

(Standard deviation calculated using all 8 games)

Standard Deviation≈2.9 points

Insights about the player’s performance

- The **mean (~19.6)** shows the player typically scores about **20 points per game**.
- The **median (19.5)** is close to the mean, indicating a balanced scoring pattern.
- The **absence of a mode** suggests the player doesn’t rely on one fixed score.
- The **range (10 points)** shows some variation between lowest and highest performances.
- The **standard deviation (~2.9)** is relatively small, meaning the player’s scoring is **fairly consistent** from game to game.

Overall: The player is a **reliable and consistent scorer** with moderate variation and a solid average performance.