ASSIGNMENT

Descriptive Statistics

QUESTIONS AND ANSWERS ARE BELOW :-

EASY LEVEL

Q1 Understanding Central Tendency .

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:- **10,12,11,15,14,13 ,15**

a. MEAN :- 10+12+11+15+14+13+127/7=877/7≈12.43

THE Mean suggests the bakery sells about 12.4 dozen muffins per day.

b.Median:- 10,12,11,15,14,13,12

Middle value = **12**

The median shows the *typical day* is 12 dozen muffins.

c.Mode:- 10,12,11,15,14,13,12

The value **12** appears twice, more than any other

The mode is also **12 dozen muffins**.

Q2 Mean in Real Life

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:- **12,15,14,16,18,20,19**

Mean =12+15+14+16+18+20+19/7

114/7= 16.29

The mean score is **16.3 marks**, which tells us that the class, on average, performed well on the quiz, with most students scoring in the mid-to-high range.

Q3 Mode in Real Life.

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:- **7,8,9,8,8,10,7,9**

Mode is **8**, since it occurs most often.

The mode is **size 8**, and this is useful because it tells the store manager which shoe size sells the most, guiding them to keep more of that size in stock.

MEDIUM LEVEL

Q4 Median in Real Life.

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**

MEAN = 8000+9500+10200+11000+50000/5

=88700/5

= 17,740

MEDIAN = Middle value (3rd one) = **$10,200**

THE MEDIAN IS **$10,200.**

The **MEDIAN** is **$10,200**. It is better than the **MEAN** because one very high price makes the **MEAN** misleading. The median shows the typical car price more clearly.

Q5 Dispersion Introduction.

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:- **25, 30, 27, 35, 40**

Range = Highest value – Lowest value

=40-25

=15Minutes

The range tell us the student's puzzle time changes by up to **15 minutes** from the *fastest day* **25 minutes** to the *slowest day* **40 minutes**.

Q6 Range in Action

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:- **100, 105, 98, 110, 120**

__Range=__ Highest value – Lowest value

=120-98

=22KG

This means the farmer's apple harvest changes by up to **22 kg** from one week to another.

Q7 Variance for Decision-Making .

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: variance = 6 delays are closer to the average.

Company B: variance = 15 delays vary more widely.

Company A is more consistent. A *__smaller variance__* **6** means their delivery times are steadier, while **Company B** *__larger variance__* **15** shows more variation in delays

__HARD LEVEL__

Q8 Standard Deviation in Context.

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 A: standard deviation = $30 → prices move up and down by about $30 from the average.

Coin B: standard deviation = $120 → prices move up and down by about $120 from the average.

Coin B is riskier. Its **standard deviation $120** is higher, so its price changes more wildly compared to **Coin A $30** , which is steadier.

Q9 Combining Measures

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?

ANS:- **400, 420, 390, 450, 410**

Mean=400+420+390+450+410/5

Mean=2070/5

=414Kwh

Standard deviation:-

1. **Find differences from the mean:**

- (400 – 414) = -14
- (420 – 414) = 6
- (390 – 414) = -24
- (450 – 414) = 36
- (410 – 414) = -4

2. **Square them:**

- $(-14)^2 = 196$
- $(6)^2 = 36$
- $(-24)^2 = 576$
- $(36)^2 = 1296$
- $(-4)^2 = 16$

3 .Average of squares :

=196+36+576+1296+16/5 =2120/5 =**424**

4.Square root of variance:

$\sqrt{424}$ **≈20.6**

The family uses about **414 units** of electricity each month on average. Their usage usually goes up or down by only about **20 units.** *This means their electricity use is steady and regular*, without big changes.

Q10 Practical Application.

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:- **15, 18, 20, 22, 25, 17, 19, 21**

a. **Mean (average) :**

=15+18+20+22+25+17+19+21/8 =157/8 **=19.625**

The mean is about **19.6 points per game**.

b. **Median (middle value):**

Arrange in order: **15, 17, 18, 19, 20, 21, 22, 25**

= 19+20/2 **= 19.5**

The median **is 19.5 points.**

c. **Mode (most frequent value):**

Each score appears only once.

No mode

d. **Range (spread):**

Range=25−15=10

The range is **10 points**.

e. **Standard Deviation (variation):**

1. Differences from mean (≈19.6):

- (15 – 19.6) = -4.6 → squared = 21.16
- (18 – 19.6) = -1.6 → squared = 2.56
- (20 – 19.6) = 0.4 → squared = 0.16
- (22 – 19.6) = 2.4 → squared = 5.76
- (25 – 19.6) = 5.4 → squared = 29.16
- (17 – 19.6) = -2.6 → squared = 6.76
- (19 – 19.6) = -0.6 → squared = 0.36
- (21 – 19.6) = 1.4 → squared = 1.96

2.Sum of squares **= 67.88**

3. Variance **=** 67.88 / 8 **= 8.49**

4. Standard deviation **= √8.49 ≈ 2.9**

The *standard deviation* **is about 3 points.**

The player scores about **20 points** each game on **average.** Their scores usually go up or down by only about **3 points**. This means the player is **<u>steady and reliable</u>**. The *lowest score* was **15** and the *highest* was **25**, so overall the performance is consistent with small changes.