Section 2.1 – Central Tendency: Mean, Median, Mode

This booklet belongs to:_____ Block:_____

- Statistics is a field of mathematics dealing with collecting, interpreting, analyzing, and summarizing data
- We must always consider statistics with an open mind and thorough understanding of any potential bias

Sample vs Population

- A **population** is the **totality** of all things under consideration
  - Example: All the students in school district 61
- A **sample** is a **selection of participants** from the population
  - Example: Students at Vic High only

Mode

Mode: The value that occurs most in a given set of values

- If all the values are equally frequent, there is not mode
- If multiple values occur equally often, there can be multiple modes

Example: What is the mode of the following data set? $0, 0, 1, 1, 1, 2, 2, 2, 3, 3$

Solution: Both 1 and 2 have a frequency of three, therefore the modes are 1 and 2

Mean

Mean: the average of the given data

- The mean is computed by adding the data collected and dividing by the total number of data points
- In the study of Statistics:

$\bar{x}$ $(x\ bar)$ is the mean of a sample, and μ (mu) is the mean of the population

$\mu = \frac{x_1 + x_2 + x_3 + \cdots + x_n}{n}$	▪ Classic mean formula
$\mu = \frac{\sum_{i=1}^{n} x_i}{n}$	▪ Mean using Sigma notation

Example: Determine the mean of: $1, 6, 3, 8, 9, 3$

Solution:

$$\mu = \frac{1 + 6 + 3 + 8 + 9 + 3}{6} = \frac{30}{6} = 5$$

Example: For 30 randomly selected high school students, the following IQ frequency distribution was obtained. Determine the mean.

Solution: When given a range, you take the midpoint (or average) or the upper and lower limits

Score Limits	Frequency
$80 \leq x \leq 90$	2
$90 \leq x \leq 100$	9
$100 \leq x \leq 110$	11
$110 \leq x \leq 120$	5
$120 \leq x \leq 130$	2
$130 \leq x \leq 140$	1

Example: 10 numbers have a mean of 37. If one number is removed, the mean is 38. What was the number that was removed?

Solution: Sum of 10 numbers: $S_{10} = 10 \cdot 37 = 370$

Sum of 9 numbers: $S_9 = 9 \cdot 38 = 342$

Removed number was: $370 - 342 = 28$

Median

Median: The median is the middle value in a list of data.

- Before we can determine this point, the data needs to be arranged in ascending or descending order.
- If there is an odd number of values it is the middle term.
- If there is an even number of values it is the mean of the two middle values.
- By formula the median term is the: $\frac{n+1}{2}$ term

Example: Odd number of values

7
5
4 ← $Median = 4$
2
1

Solution:

$5\ terms, so\ the\ median\ is\ \frac{5+1}{2} = 3^{rd}\ term$

Example: Even number of values

2
3
4 ← $Median = \frac{4+7}{2} = 5.5$
7
7
8

Solution:

$6\ terms, so\ the\ median\ is\ \frac{6+1}{2} = 3.5$

So, $Median = \frac{3^{rd}\ term + 4^{th}\ term}{2}$

Section 2.1 – Practice Problems

1. The incomes of a sample of 6 local restaurant managers are as follows:

   $\$41\,500, \$44\,900, \$39\,700, \$62\,000, \$58\,500, \$53\,100$

   What is the mean, median and mode of the 6 managers?

2. The following frequency distributions represents the monthly commissions in dollars for 25 car salespersons at a car lot. Determine the mean median and mode.

Commission in $	Frequency
$800 \leq x \leq 1600$	3
$1600 \leq x \leq 2400$	4
$2400 \leq x \leq 3200$	6
$3200 \leq x \leq 4000$	12

3. The mean age of five people is 39. The ages of four of these people are $33, 45, 27, and\ 41$. Find the age of the fifth person

4. The mean score of 18 female students on a math test is 72 and the mean score of 14 male students is 66. Find the combined mean score.

5. Determine the mean, median, and mode of the salaries of the staff listed below.

Staff	Salary
One Owner	$80 000
One Manager	$60 000
Two Salespeople	$48 000
Six Technicians	$44 000

6. If there are 8 numbers with a mean of 10 and 12 other numbers with a mean of 16, what is the mean of all 20 numbers?

7. If the mean of 50 numbers is 18 and the mean of the first 30 numbers is 16, what is the mean of the last 20 numbers?

8. The mean of 50 numbers is 38. If two of the numbers, say 45 and 55, are removed, what is the mean of the remaining numbers?

Answer Key – Section 2.1

1. $Mean$: \$49 950, $Median$: \$49 000, $Mode$: $None$	2. $Mean$: \$2864, $Median$: \$2800, $Mode$: \$3600
3. 49	4. 69.4
5. $Mean$: \$50 000, $Median$: \$44 000, $Mode$: \$44 000	6. 13.6
7. 21	8. 37.5

Extra Work Space