

Name: _____

Date: _____

**POPULATION PARAMETERS
COMMON CORE ALGEBRA II**



When we conduct a study, the complete set of all subjects that share a common characteristic that is being studied is known as the **population**. All populations have **natural or inter-individual variability**. Most of the time, the entire population is not measured, but a sample is taken to infer characteristics of a population. Still, all populations in theory have **population parameters** that describe the population, such as its mean, standard deviation, and interquartile range.

Exercise #1: 18 students in Mr. Weiler's Advanced Calculus class took a quiz with the following results in ascending order.

56, 68, 72, 72, 75, 78, 80, 84, 84, 85, 88, 88, 90, 93, 95, 99, 100, 100

(a) Use your calculator to determine the mean, the median, and the quartiles for this data set. Then, construct a simple box-and-whiskers (box plot) for this data set.

(b) What is the interquartile range of this data set? In theory, what percent of the data set should lie between the first and third quartiles? Is that true for this data set?

(c) What is the population standard deviation for this data set to the nearest tenth? How do you interpret the standard deviation?

(d) What percent of the scores were within one standard deviation of the mean? Within two standard deviations of the mean? Round your percents to the nearest percent and show your work.

Within One Standard Deviation of the Mean

Within Two Standard Deviations of the Mean



Sometimes data is grouped in a frequency chart. We still should be able to calculate the basic population parameters when the information is given in this form.

Exercise #2: A small company has salaries for their 50 employees as given in the table below

(a) Find the mean and standard deviations of the salary range.

Salary (x_i)	Frequency (f_i)
25,000	5
32,000	21
45,000	14
58,000	7
75,000	2
120,000	1

(b) What is the median of this data set? Why is the median considerably lower than the mean in this data set?

(c) Does more or less than 50% of the data set fall within one standard deviation of the mean? Show the analysis that leads to your answer.

Although we have often concentrated on experimental studies where data is collected and means are found, many times we use statistics to represent results of a survey where we are interested in what **proportion** of a **population** share a certain characteristic. These proportions are most expressed as decimals, but sometimes are represented by fractions or percents.

Exercise #4: A questionnaire went home to all juniors concerning their ability to bring and use mobile devices at school. The questionnaires constituted a **census** since all of the juniors were surveyed. Of the 742 juniors, 564 of them reported having web-enabled mobile devices. What was the population proportion for web-enabled devices? Express your answer as a decimal and as a percent.

Exercise #5: The proportion of eggs that get cracked in a local egg handling facility is 0.023. If 2,500 dozen eggs are packaged in the factor per day, what should we expect to be the number of eggs cracked per day?

- (1) 350
- (2) 450
- (3) 230
- (4) 690



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**POPULATION PARAMETERS
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FLUENCY

1. Which of the following formulas, written in summation notation, would represent the mean of the data set $\{x_1, x_2, \dots, x_n\}$? Explain your choice.

(1) $\sum_{i=1}^n x_i$

(3) $n \sum_{i=1}^n x_i$

(2) $\frac{1}{n} \sum_{i=1}^n x_i^2$

(4) $\frac{1}{n} \sum_{i=1}^n x_i$

2. The standard deviation of a population characteristics measures

- (1) The difference between the maximum and minimum values.
- (2) The difference between the third quartile and first quartile values.
- (3) The average distance a data value is away from the mean.
- (4) The average distance a data value is away from the median.

3. The interquartile range of the data set $\{4, 7, 10, 13, 18, 22, 30\}$ is

(1) 15

(3) 7

(2) 18

(4) 10

APPLICATIONS

4. If 348 freshmen out of 622 have cell phones, then the population proportion, p , for freshmen cell phone ownership is

(1) 0.56

(3) 0.72

(2) 0.35

(4) 0.44

5. If a population has 824 subjects, then about how many would have characteristics in the upper quartile?

(1) 412

(3) 368

(2) 280

(4) 206



6. A school is tracking its freshmen attendance for the first marking period. Shown below is a table summarizing their findings for the 284 members of the freshmen class.

(a) Find the mean and median number of days absent. Round your mean to the nearest tenth.

(b) What is the population standard deviation for this data set? Round to the nearest tenth.

(c) What proportion of the population that has an absenteeism greater than 4 days?

Days Absent (x_i)	Number of Students (f_i)
0	158
1	64
2	18
3	22
4	4
5	7
6	8
9	2
13	1

7. The heights of the 15 players on the Arlington boys' varsity basketball team are given below in inches.

66, 67, 68, 68, 70, 72, 72, 73, 74, 75, 75, 75, 76, 77, 79

(a) Find the mean and standard deviation of this data set. Use the population standard deviation. Round both to the nearest *tenth*.

(b) Determine the proportion of the population that falls within one standard deviation and within two standard deviations of the mean. State your values in decimal form.

One standard deviation from the mean:

(c) Use the random number table for this lesson to pick a random sample of five players from this list. Do this by picking a random two digit column along the page. Scan down the column until you have picked 5 random integers that fall from 1 to 15. Write down your sample and calculate its mean.

Two standard deviations from the mean:

