**Unit 11: Univariate data**

**Lesson 2: Statistics – Measures of Central Tendency and Spread**

**Objectives:**

* I can construct frequency tables
* I can calculate the mean, median, range and standard deviation of a data
* I can identify an outlier and understand its effect on the median and mean.
* I understand the benefit of calculating the mean or median as central tendency measures
* I understand the benefit of calculating the range and standard deviation as measures for the spread or variation.

**Agenda:**

* Video
* Applications

**Focus Question:**

* What is the difference between the mean, and the median?
* How does the standard variation describe the variations in the data.

**Vocabulary:** Mean /Median, Measures of Central Tendency, range, standard deviation, measure of spread or variation, frequency table

**Homework: 10-2**

**Web support:**

<https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-center-distributions/v/statistics-intro-mean-median-and-mode>

<https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-center-distributions/v/mean-median-and-mode>

<https://www.youtube.com/watch?v=_dE1zDbFAbQ>

<https://www.youtube.com/watch?v=izIVhQrt7tI>

<https://www.youtube.com/watch?v=y6Fg7DHZ2J0>

<https://www.youtube.com/watch?v=qcBMckOgB0w>

<https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-spread-distributions/v/range-variance-and-standard-deviation-as-measures-of-dispersion>

**Web Practice:**

<https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-center-distributions/e/mean_median_and_mode>

<https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-spread-distributions/e/standard_deviation_of_a_population>

<https://www.ixl.com/math/algebra-1/mean-median-mode-and-range>

<https://www.ixl.com/math/algebra-1/identify-an-outlier>

**Lesson 2: Statistics intro:**

**Exercise 1:** Ms. Stewart’s Advanced Calculus Course, fourteen students recently took a test. Their grades were as follows: 45, 93, 93, 85, 85, 82, 87, 87, 89, 93, 95, 87, 87 and 87

1. Construct a frequency table for this data.
2. Calculate the mean and median, range, standard deviation of this data set. Explain how you can calculate these values without the use of a calc.

\*Mean:

\*Median:

\*Range:

\*S Deviation:

1. Is there an outlier? If yes, list its value?
2. Which value, the mean or the median, is a better measure of how well the average student did on Ms. Stewart’s test? Must justify your conclusion.



**Exercise 2:** A farm is studying the weight of baby chickens (chicks) after 1 week of growth. They find the weight, in ounces, of 20 chicks. The weights are shown below.

 2, 1, 3, 4, 2, 2, 3, 1, 5, 3, 4, 4, 5, 6, 3, 5, 4, 6, 3

1. Construct a frequency table for the data.
2. Find the mean, median and range, Round any non-integer values to the nearest tenth.
3. Which measure the mean or median is the best measure of the average weight of the chicks after 1 week?
4. Find the standard deviation for this data set. Round any non-integer values to the nearest tenth. Give an interpretation of the standard deviation.

**Extensions:**

1) Andy has grades of 84, 65, and 76 on three math tests.  What grade must he obtain on the next test to have an average of exactly 80 for the four tests?

1. Kyle has received the following grades on his first 4 math tests: 87, 93, 91, and 88. What grade must he receive on his 5th test to have an average of 90 in the class? Only an algebraic solution will be accepted
2. if the scores 18, 20, 25, 11 and x have a mean of 19. What is the value of x.

**4)** Find, in terms of x, the mean of 3x -5, 5x – 6, and 4x + 11.

5)Given 2x + ax - 7 >-12, determine the largest integer value of a when x = -1.

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_,\_\_\_\_,\_\_\_\_**

**Algebra I HW 11-2**

1) The weekly salaries of six employees at McDonalds are $240, $420, $90, $180, $140, $600.  For these six salaries, find:

(a) the mean (b) the median (c) the range (d) standard deviation

e.Which value, the mean or the median, is a better measure of what the average weekly salary for these employees is at McDonalds.

2) The values of **11 houses** on Washington St. are shown in the table below.



1. Find the mean and median values of these houses in dollars.
2. Do we have an outlier? If yes what value?
3. Which value, the mean or the median, is a better measure of what the average house value is in Washington st.

3) Your teacher recorded the math test scores of six students in the table below.

a. Determine the mean, median, and range of the student scores, to the *nearest tenth*.

1. Find the standard deviation.

4) Which of the following data sets has a median of 7.8?

(1) {6, 7, 8, 9, 10} (3) {1, 3, 7, 10, 14}

(2) {3, 5, 7, 8, 10, 14} (4) {2, 7, 9, 11, 14, 17}

5) Which of the following is true about the data set {2, 4, 6, 7, 9}?

(1) median > range (3) mean > median

(2) median = mean (4) median > mean

6) Given the data set:

{13, 3, 10, 9, 7, 10, 12, 8, 6, 3, 9, 6, 11, 5, 9, 13, 8, 7, 7}

1. Construct a frequency table.
2. Find the **mean**, **median, range, and standard deviation**

|  |  |
| --- | --- |
| Number of accidents | Number of people |
| 0 | 3 |
| 1 | 9 |
| 2 | 6 |
| 3 | 2 |
| 13 | 1 |

7) A survey is taken by an insurance company to determine how many car accidents the average New York City resident has gotten into in the past 10 years. The company surveyed 20 people who are getting off a train at a subway station. The following table gives the results of the survey

1. Calculate the mean median number and range of accidents of this data set
2. Are there any outliers in this data set? If so, what data value?
3. Which number, the mean or the median, better represents the number of accidents an average person in this survey had over this 10 year period? Explain your answer.

d. Does this sample fairly represent the average number of accidents a typical New York City resident would get into over a 10 year period? Why or why not?

8) The science test grades are posted.  The class did very well.  All students taking the test scored over 75.  Unfortunately, a student was absent for the test and the computer listed her score as 0 until the test is taken.  Assuming that the lowest score that present students had was a 60, what measure of central tendency would most likely give the best representation of this data?

**Exercise 3:** The test scores for five students were 59, 60, 63, 76, and 97.

1. How many points greater than the median is the mean?
2. What is the range and standard deviation?
3. Is there an outlier? If yes what value?
4. Which value, the mean or the median, is a better measure of what the average score is on the test?

**Example 4:** The heights (in inches) of 9 women were as shown below.

* 1. 70.9 67.4 67.7 67.1 69.2 66.0 70.3 67.6
1. Calculate the mean and median of this data set.
2. What is the range and standard deviation?
3. Is there an outlier? If yes what value?
4. Which value, the mean or the median, is a better measure of the average height for women?

|  |  |
| --- | --- |
| The score | Number of students |
| 90 | 5 |
| 85 | 10 |
| 78 | 7 |
| 70 | 6 |
| 35 | 1 |

**Exercise 5:** Look at the table and identify

1. The mean, median, range and standard deviation of the scores on a test
2. Do we have an outlier? If yes what value?
3. Which value, the mean or the median, is a better measure of what the average score on the test is.

***Exercise* 6:** A marketing company is trying to determine how much diversity there is in the age of people who drink different soft drinks. They take a sampleof people and ask them which soda they prefer. For the two sodas, the age of those people who preferred them is given below.

**Soda A:** 18, 16, 22, 16, 28, 18, 21, 38, 22, 29, 25, 44, 36, 27, 40

**Soda B:** 25, 22, 18, 30, 27, 19, 22, 28, 25, 19, 23, 29, 26, 18, 20

1. Calculate the mean, median, range and standard deviation for each set of data. Round your answers to the nearest tenth
2. Explain why standard deviation is a better measure of the diversity in age than the mean.
3. Which soda appears to have a greater diversity in the age of people who prefer it? How did you decide on this?