Names: ______________________ ______________________ ______________________

Activity #1: Basic Parameters (Solutions) **Statistics**

1. Find the mean of the following list of numbers.

$$8,\ 7,\ 14,\ 10,\ 15,\ 15,\ 13,\ 13$$

Solution: Remember that to find the mean of n numbers x_1, x_2, $\ldots$, x_n, we add them up and divide by the number of numbers. In this case,

$$\begin{aligned} \frac{8+7+14+10+15+15+13+13}{8} &= \frac{95}{8} \\ &\approx 11.8. \end{aligned}$$

2. Find the mean of the following list of numbers.

$$75,\ 79,\ 81,\ 67,\ 60,\ 66,\ 71,\ 68,\ 74,\ 76$$

Solution: Remember that to find the mean of n numbers x_1, x_2, $\ldots$, x_n, we add them up and divide by the number of numbers. In this case,

$$\begin{aligned} \frac{75+79+81+67+60+66+71+68+74+76}{10} &= \frac{717}{10} \\ &\approx 71.7. \end{aligned}$$

3. Find the mean of the following list of numbers.

$$4,\ 2,\ 1,\ 3,\ 1,\ 2,\ 1,\ 4$$

Solution: Remember that to find the mean of n numbers x_1, x_2, $\ldots$, x_n, we add them up and divide by the number of numbers. In this case,

$$\begin{aligned} \frac{4+2+1+3+1+2+1+4}{8} &= \frac{18}{8} \\ &\approx 2.2. \end{aligned}$$

4. Find the mean deviation of the following list of numbers.

$$10,\ 12,\ 15,\ 11,\ 8$$

Solution: Remember that the mean deviation of $x_1, x_2, \ldots, x_n$ is

$$\frac{1}{n}\sum_{i=1}^{n}|x_i - \overline{x}|,$$

where $\overline{x}$ is the mean of the x_i. In this case the mean is $\overline{x} = 11.20$. Then the mean deviation is

$$\begin{aligned}
& \frac{1}{5}\big(|10 - 11.20| + |12 - 11.20| + |15 - 11.20| + |11 - 11.20| + |8 - 11.20|\big) \\
= \;& \frac{1}{5}\big(1.20 + 0.80 + 3.80 + 0.20 + 3.20\big) \\
= \;& 1.84
\end{aligned}$$

5. Find the mean deviation of the following list of numbers.

$$1,\ 6,\ 5,\ 8,\ 4,\ 2$$

Solution: Remember that the mean deviation of $x_1, x_2, \ldots, x_n$ is

$$\frac{1}{n}\sum_{i=1}^{n}|x_i - \overline{x}|,$$

where $\overline{x}$ is the mean of the x_i. In this case the mean is $\overline{x} = 4.33$. Then the mean deviation is

$$\begin{aligned}
& \frac{1}{6}\big(|1 - 4.33| + |6 - 4.33| + |5 - 4.33| + |8 - 4.33| + |4 - 4.33| + |2 - 4.33|\big) \\
= \;& \frac{1}{6}\big(3.33 + 1.66 + 0.66 + 3.66 + 0.33 + 2.33\big) \\
= \;& 2.00
\end{aligned}$$

6. Find the standard deviation of the following list of numbers.

$$8,\ 15,\ 8,\ 8,\ 12$$

Solution: Remember that the standard deviation of $x_1, x_2, \ldots, x_n$ is

$$\sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n-1}},$$

where $\overline{x}$ is the mean of the x_i. In this case the mean is $\overline{x} = 10.20$. Then the standard deviation is

$$\begin{aligned}
& \sqrt{\frac{1}{4}\big((8 - 10.20)^2 + (15 - 10.20)^2 + (8 - 10.20)^2 + (8 - 10.20)^2 + (12 - 10.20)^2\big)} \\
= \;& \sqrt{\frac{1}{4}\big(4.84 + 23.04 + 4.84 + 4.84 + 3.24\big)} \\
= \;& 2.85
\end{aligned}$$

7. Suppose we have collected the following list of numbers.

$$4, 6, 2, 24, 17, 13, 14, 9, 23, 15$$

Compute the z-scores of 1 and 25 with respect to this list.

Solution: Remember that the z-score of a particular number x with respect to a list of numbers is

$$z = \frac{x - \overline{x}}{s},$$

where $\overline{x}$ is the mean and s the standard deviation. In this case we can see that $\overline{x} = 12.7$ and $s = 7.128$, so that the z-score of 1 is

$$\frac{1 - 12.7}{7.128} = -1.641$$

and of 25 is

$$\frac{25 - 12.7}{7.128} = 1.725.$$

8. Suppose we have collected the following list of numbers.

$$7, 5, 7, 8, 7, 8, 7, 5, 5, 9$$

Compute the z-scores of 2 and 12 with respect to this list.

Solution: Remember that the z-score of a particular number x with respect to a list of numbers is

$$z = \frac{x - \overline{x}}{s},$$

where $\overline{x}$ is the mean and s the standard deviation. In this case we can see that $\overline{x} = 6.8$ and $s = 1.326$, so that the z-score of 2 is

$$\frac{2 - 6.8}{1.326} = -3.618$$

and of 12 is

$$\frac{12 - 6.8}{1.326} = 3.919.$$

9. Find the coefficient of variation of the following list of numbers.

$$18, 16, 19, 11, 16, 19$$

Solution: Remember that the coefficient of variation of a list of numbers is $100\% \cdot s/\overline{x}$, where s is the standard deviation and $\overline{x}$ the mean, expressed as a percentage. In this case the mean is $\overline{x} = 16.5$ and the standard deviation is $s = 2.75$, so the coefficient of variation is $100\% \cdot s/\overline{x} = 16\%$.

10. Find the coefficient of variation of the following list of numbers.

$$5, 8, 6, 7, 6, 8, 7$$

Solution: Remember that the coefficient of variation of a list of numbers is $100\% \cdot s/\overline{x}$, where s is the standard deviation and $\overline{x}$ the mean, expressed as a percentage. In this case the mean is $\overline{x} = 6.7$ and the standard deviation is $s = 1.03$, so the coefficient of variation is $100\% \cdot s/\overline{x} = 15\%$.