**Kerry Ojakian's MTH 23 Class**
**Due Date:** Tuesday November 16

# HW #2

**General Instructions:**

- Homework must be relatively neat.

- Homework exercises must be done in order (if you skip an exercise, still write down the number and leave some blank space).

- You must show all work.

- While you may work with other students or tutors, do not copy someone else's work or data, or have someone else do the work for you.

# The Assignment

1. Suppose we have the following two data sets:

   - $X: \ x_1 = 6, \ \ x_2 = -7, \ \ x_3 = 6, \ \ x_4 = 0, \ \ x_5 = -8$
   - $Y: \ y_1 = 3, \ \ y_2 = -10, \ \ y_3 = -14, \ \ y_4 = 3$

   Evaluate the following:

   (a) $\sum y$

   (b) $\left( \sum x \right) / 5$

2. Compute a 93% Chebyshev interval for some data that has mean -5 and standard deviation 3.

3. Suppose the ages of a sample of some professors is 50, 40, 40, 30, 60, 70.

   Do all of the following problems by hand showing step by step work (in particular, for the variance and standard deviation, use the worksheet).

   (a) Find the mean, median, mode, and range.
   (b) Find the variance and standard deviation.

4. Suppose two 6-sided dice are rolled (each die is numbered 1 to 6).

    (a) What is the probability that the sum of the dice is 9?

    (b) What is the probability that both dice are 4 or higher?

5. Given $P(A) = 0.2$ and $P(B) = 0.4$:

    (a) If A and B are independent events, compute $P(A$ and $B)$.

    (b) If instead $P(A \mid B) = 0.1$, compute $P(A$ and $B)$.

6. Given $P(A) = 0.3$ and $P(B) = 0.4$:

    (a) If A and B are mutually exclusive events, compute $P(A$ or $B)$.

    (b) If $P(A$ and $B) = 0.1$, compute $P(A$ or $B)$.

7. Suppose the probability of getting sick is 0.25, and the probability of getting caught in a storm is 0.3. Suppose the probability of getting sick *and* caught in a storm is 0.1.

    (a) What is the probability of getting sick or getting caught in a storm?

    (b) Based on the probabilities, is getting sick independent of getting caught in a storm?

    (c) What is the probability of getting sick given that you get caught in a storm?

8. Suppose 15% of senior citizens (people 65 years of age and older) get the flu each year and 24% of people under 65 years old get the flu each year. Also suppose that the population consists of 12% senior citizens.

    (a) If you choose a random person from the population, what is the probability that she is a senior citizen?

    (b) What is the probability that a random person is under 65 years of age?

    (c) What is the probability that a a person gets the flu given that she is a senior citizen?

    (d) What is the probability that a randomly selected person is both a senior citizen and gets the flu?

    (e) What is the probability that person selected at random is a person under age 65 who will get the flu?

9. Suppose $X$ is a binomial random variable with $n = 10$ and $p = 0.23$. Compute the following using Excel:

   (a) $P(X = 4)$

   (b) $P(X \leq 4)$

   (c) $P(X > 4)$

10. Suppose that a store makes over \$800 on 60% of the days.

    (a) Suppose the store is open for 20 days. What is the probability that the store will make over \$800 every day?

    (b) Suppose the store is open for 10 days. What is the probability that the store will make over \$800 for at least 6 days?

    (c) Suppose the store is open for 10 days. What is the probability that the store will make **less than** \$800 for at least 6 days?

11. Suppose $X$ is normaly distributed with a mean of 30 and standard deviation of 5. Find the following using Excel (write down exactly what your Excel work is, and give the final answer).

    (a) $P(X < 28)$

    (b) $P(X > 26.5)$

    (c) $P(29 < X < 30.5)$

12. Page 391 from Open Stax Textbook: Exercise 75b (Use Excel)

13. Suppose the police have a response time that is normally distributed with a mean of 8.5 minutes and a standard deviation of 1.5 minutes.

    Answer the following questions **using the Empircal Rule, without Excel**.

    (a) What is the probability that the response time is between 7 and 10 minutes?

    (b) What is the probability that the response time is less than 10 minutes?

    (c) What is the probability that the response time is less than 7 mintues?

    (d) What is the probability that the response time is **more** than 7 minutes?