Kerry Ojakian's MTH 23.5 Class
Due Date: Tuesday October 29

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:

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

   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. Compute the Sample Variance, Sample Standard Deviation, Population Variance, and Population Standard Deviation of the following data:

$$-2, 4, 0, -5, -2.$$

You must do this by hand, by printing out and filling in all parts of the handout "Worksheet for Variance and Standard Deviation" available at the webpage (or you may carefully copy the table onto your paper).

10. (a) If the sample variance is 64, find the sample standard deviation.

    (b) If the sample standard deviation is 7, what is the sample variance?

11. Suppose some data has mean 15 and standard deviation 3.

    (a) Compute a 75% Chebyshev interval for the data.

    (b) Compute a 88.9% Chebyshev interval for the data.

12. Suppose A is some event and $Pr(A) = 4/14$. Do the following: 1) Write the probability as a reduced fraction, 2) Write the probabiliy as decimal, 3) Write the probability as a percent.

13. Perform the operation and simplify

    (a) $\dfrac{6}{21} \div \dfrac{8}{7}$

    (b) $\dfrac{-3}{8} - \dfrac{1}{6}$

14. Evaluate the following expressions at the given values.

    (a) $x - \dfrac{3}{2}$ if $x = \dfrac{1}{2}$

    (b) $2x + 3$ if $x = 0.5$

    (c) $x^2 + y^2 - \dfrac{1}{6}$ if $x = -2$, $y = \dfrac{1}{2}$

15. Solve the following equations for the indicated quantity.

    (a) Solve for y in the formula $5x + y = 70$

    (b) Solve for b in the formula $a + b + c = x^3$

    (c) Solve for x in the formula $2x + 6y = 4$

    (d) Solve for $P(A)$ in the formula $P(A \ or \ B) = P(A) + P(B)$.

    (e) Solve for $P(A)$ in the formula $P(A \ or \ B) = P(A) + P(B) - P(A \ and \ B)$.

    (f) Solve for $P(A \ and \ B)$ in $P(A|B) = \dfrac{P(A \ and \ B)}{P(B)}$

    (g) Solve for $P(B)$ in $P(A|B) = \dfrac{P(A \ and \ B)}{P(B)}$