Practice for Midterm Exam I Math 11, UCSD, Winter 2018 (Do not turn in!)

Exercise I

Below is a histogram of the ages of female cardiac patients at a local hospital.



1. Briefly discuss the modality and symmetry of this histogram.

2. Do you expect the mean to be greater than or less than the median? Provide a reason for your prediction.

3. If you were going to report the center and spread using either (the mean and standard deviation) OR (the median and interquartile range), which is a better statistical choice for this data set? Provide a reason for your choice.

Exercise II

Many people believe that gender, weight, drinking habits, and many other factors are much more important in predicting blood alcohol content (BAC) than simply considering the number of drinks a person consumed. Here we examine data from sixteen student volunteers at Ohio State University who each drank a randomly assigned number of cans of beer. These students were evenly divided between men and women, and they differed in weight and drinking habits. Thirty minutes later, a police officer measured their blood alcohol content (BAC) in grams of alcohol per deciliter of blood. The following scatterplot summarizes their findings:



The regression coefficients they found are $b_0 = -0.0127$ and $b_1 = 0.0180$.

1. Briefly describe the relationship between the number of cans of beer and BAC.

2. Write the equation of the regression line. Interpret the slope and intercept in context.

3. The correlation coefficient for number of cans of beer and BAC is 0.89. Calculate R^2 and interpret it in context.

Exercise III

Sally gets a cup of coffee and a muffin every day for breakfast from one of the many coffee shops in her neighborhood. She picks a coffee shop each morning at random and independently of previous days. The average price of a cup of coffee is \$1.40 with a standard deviation of \$0.30, the average price of a muffin is \$2.50 with a standard deviation of \$0.15, and the two prices are independent of each other.

1. What is the mean and standard deviation of the amount she spends on breakfast daily?

2. What is the mean and standard deviation of the amount she spends on breakfast weekly (7 days)?

Exercise IV

The American Community Survey is an ongoing survey that provides data every year to give communities the current information they need to plan investments and services. The 2010 American Community Survey estimates that 14.6% of Americans live below the poverty line, 20.7% speak a language other than English (foreign language) at home, and 4.2% fall into both categories.

1. Are living below the poverty line and speaking a foreign language at home disjoint?

2. Draw a Venn diagram summarizing the variables and their associated probabilities.

3. What percent of Americans live below the poverty line and only speak English at home?

4. What percent of Americans live below the poverty line or speak a foreign language at home?

5. What percent of Americans live above the poverty line and only speak English at home?

6. Is the event that someone lives below the poverty line independent of the event that the person speaks a foreign language at home?

Exercise V

Two boxes, labeled 1 and 2, contain balls.

- Box #1 contains 3 red, 2 white, and 3 black balls;
- Box #2 contains 4 red, 3 white, and 1 black ball;

You pick an urn at random and, from this urn, you draw one ball at random.

- 1. Draw a tree diagram of this setup.
- 2. Make a contingency table of this setup.
- 3. What is the probability that the ball is not white?
- 4. If the ball you draw is red, what is the probability it has been drawn from Box #1?