## FINAL MOCK EXAM

1. In order to determine the percentage of Americans who enjoy coffee, 500 Americans were randomly selected and polled. Of those polled, 290 said they liked coffee

A) What is the population?

B) What is the sample?

C) What is the population data?

D) What is the sample data?

E) What is the population parameter?

F) What is the sample statistic?

G) What is your best estimate of the population parameter?

2. Imagine a container with 10 balls labeled 1-10. (Room provided if you would like to illustrate that)

A) If you draw 2 balls from the container <u>with replacement</u>, what is the probability that both have numbers on them that are bigger than 4?

B) If you draw 2 balls from the container <u>without replacement</u>, what is the probability that both have numbers on them bigger than 4?

C) If you draw 2 balls from the container <u>without replacement</u>, what is the probability that neither have numbers on them that are bigger than 4?

D) If you draw 2 balls from the container <u>without replacement</u>, what is the probability that at least one has a number on it bigger than 4?

3. Suppose you are going to spin a roulette wheel at a casino. If the ball lands on any even number greater than 25, you will win \$150. If it lands on any odd number less than 9, you will win \$100. If it lands on either green slots, you will lose \$75 dollars. And if it lands anywhere else, you will lose \$50. Let *X* denote the amount of money you will win when playing this game once.

A) Find the probability distribution of *X* 

B) Find the expected value of X

C) Find the Standard Deviation of *X* 

D) Explain the meaning of your answer from part (B)

4. The runtime of a youtube video has a normal distribution with a mean of 15 minutes and a standard deviation of 4 minutes.

A) What is the probability that the next time you watch a youtube video it will take at most 20 minutes?

B) What is the probability that the next time you watch a youtube video it will last more than 22 minutes?

C) What is the probability that the next time you watch a youtube video it will take between 12 minutes and 17 minutes?

D) What does the probability you found in part (B) mean?

5. Consider the experiment where in order to complete the experiment once you have to first flip a single coin then draw a single card from a standard poker deck.

A) What is the sample space?

B) Define a random variable on this experiment.

6. Martha is somewhat forgetful. The probability of her losing her keys in the morning is about 32%. Assume that Martha losing her keys is independent of the other times she loses her keys. Let *X* denote the number of times Martha loses her keys among the next 29 times she experiences forgetfulness.

A) What distribution does *X* have?

B) Find the other 6 things you are supposed to list when solving problems for this kind of random variable.

C) What is the probability that Martha can't find her keys 12 times?

D) What is the probability that Marhta loses her keys between 10 and 12 times (inclusive)?

E) What is the expected value, standard deviation, and variance of X?

7. Suppose the random variable *X* has a uniform distribution on the interval [12, 38].

A) Find the value of c that makes this a probability distribution

B) Find P(X=19)

C) FInd P(15< X < 23)

8. Suppose X is a random variable whose density curve is given below.



A) What are all possible values of X?

B) Find P(-10< X < 15)

9. In order to figure out the percentage of dogs who know more than 3 tricks, 430 dogs were randomly selected and polled. Of the 430 asked, 150 know more than 3 tricks.

A) What is the population?

B) What is the sample?

C) What is the population parameter?

D) What is the best point estimate for the population parameter we are trying to estimate?

E) Find a 95% confidence interval for the percentage of dogs who know more than 3 tricks.

F) What does the 95% in a 95% confidence interval mean?

10. A new Ramen shop is opening up and the owner wants to figure out how long the average wait time for a customer to get their Ramen will be. The owner takes data from the first 3 hours of sales and comes up with these figures, he sampled 70 individual customers. The average wait time he found was 480 seconds with a standard deviation of 88 seconds. Find a 90% confidence interval for the average wait time of a customer.

11. A candy maker believes that his old candy making machine is too inconsistent in filling orders, so he tries testing a new machine to see if he should make the switch. Under the old system, a random sample of 15 candy shipment collection times was obtained and had a standard deviation of 3 minutes. Under the new system, a random sample of 9 candy shipment collection times was obtained and had a standard deviation of 2.5 minutes. At the .10 significance level, is there enough evidence to convince the candy maker to switch to the new system? Use the P-Value method.

12. In order to study the relationship between how much people sugary snacks people eat and how long it takes to develop diabetes, 10 chronic snackers who already have diabetes were asked how many sugary snacks they eat in a day and how old they were when they first developed diabetes. The data is summarized below.

# of sugary snacks per day (x)	3	10	16	24	5	18	8	10	12	12
Age diabetes devoloped (y)	68	61	48	44	68	49	59	59	54	52

In order to facilitate the rest of the calculations, here are some of the calculations already done for you:

Sum(x) = 118  $sum(x^2) = 1,742$  sum(y) = 562  $sum(y^2) = 32,192$  sum(xy) = 6,194

a) Find r. What does the sign of r tell you about the data?

b) Find the equation of the least squares regression line for this data

c) Find the best point estimate for the age at which a person who eats 20 sugary snacks per day is likely to develop diabetes.

d) Find a 95% prediction interval for the age at which a person who eats 20 sugary snacks per day is likely to develop diabetes.

13. Ages of parents when having their first child in 1990, 28% of parents were in there late teens (17-19), 52% of parents were in their 20's, 15% of parents were in their 30's, and 5% were 40 or older, in order to see if the age distribution has changed since then, 200 current parents having their first child were polled and asked for their age. The results are as follows:

AGE	FREQUENCY
Late Teen (17-19)	70
20-29	96
30-39	30
40 or older	4

At the alpha = 0.10 significance level, test the claim that the age distribution of current parents having their first child is the same as it was in 1990.