Math 1600, Section 11, Fall 2016 – Statistics
Midterm 2 Review Sheet (Chapters 5, 6, 7 and 8 (except 8.5))

1. Define a **random variable**.
2. Define a probability distribution.
3. Give an example of a discrete random variable.
4. Give an example of a continuous random variable.
5. What is a **Bernoulli Trial**?
6. What is a probability model?

Chapter 5 (from Quiz 2 review)

7. A company that sells magazine subscriptions announces a sweepstakes to attract new customers. The prizes and chances of winning are listed on the advertisement flyer as:

Prize	Chance
$50,000	1 in 250,000
$5,000	1 in 50,000
$100	1 in 500

Calculate your expected winnings.

8. The number of days, X, that it takes the post office to deliver a letter between City A and City B has the probability distribution:

X	f(x)
3	.4
4	.4
5	.2

a. Find the expected number of days for the post office to deliver a letter between City A and City B.
b. Find the standard deviation of the number of days for the post office to deliver a letter between City A and City B.
c. Draw the probability histogram and locate the mean on the histogram.

9. Calculate the mean and the standard deviation of the binomial distribution with:
$n = 14$ and $p = .4$

10. Let X be the number of successes in the 14 trials. Using the **formula**, with $p = .4$, compute:
$P[X = 6]$

Chapter 6 (from Quiz 2 review)

11. If X is normally distributed with a mean on 100 and a standard deviation of 8, find
a. $P[X < 107]$
b. $P[X > 90]$
c. $P[96< X < 106]$

12. If X is normally distributed with a mean on 100 and a standard deviation of 5, find b such that
a. $P[X < b] = .6700$
b. $P[X > b] = .0110$

13. The weights of apples served in a restaurant are normally distributed with a mean of 5 ounces and standard deviation of 1.6 ounces. What is the probability that the next person served will be given an apple that weighs less than 4 ounces?

Chapter 7 (from Quiz 2 review)

14. A random sample of size 60 is taken from a population having a mean of 43 and a standard deviation of 5. The shape of the population distribution is unknown.
a. What can you say about the probability distribution of the sample mean $\overline{X}$?
b. Find the probability that $\overline{X}$ will exceed 45.6.

15. The amount of sulfur in daily emissions from a power plant has a normal distribution with a mean of 96 pounds and a standard deviation of 20 pounds. A random sample of five days is taken:
a. What can you say about the probability distribution of the sample mean $\overline{X}$?
b. Find the probability that the total amount of sulfur emissions will exceed 500 pounds.

Chapter 8 (16, 17, 18 are from Lab 12; 19 and 20 are from class Nov. 18th))
16. In a study to determine whether a certain stimulant produces hyperactivity, 55 mice were injected with 10 micrograms of the stimulant. Afterward each mouse is given a hyperactivity rating score. The mean score was 14.9 and the standard deviation was 2.8.

a. Construct a point estimate for μ, the population mean score, and give its 95% error margin.
b. Construct a 99% confidence interval for μ, the population mean score.

17. Determine the sample size n that is required for estimating the population mean, when:

a. σ = 4.8, 95% error margin = .75
b. σ = 135, 80% error margin = 4.5
c. σ = .082, 98% error margin = .025

18. On the basis of the data of a large sample from a population, one finds that the 95% confidence interval for the population mean μ is (52.6, 58.2). Use this information to determine

a. A point estimate of μ and its 95% error margin
b. An 80% confidence interval for μ

19. Biological Oxygen Demand (BOD) is an index of pollution that is monitored in the treated effluent of paper mills on a regular basis. From 43 determinations of BOD (in pounds per day) at a particular paper mill during the spring and summer months of 1992. The company has set a target that the mean BOD should be 3000 pounds per day. Do the sample data indicate that the actual amount of BOD is significantly off the target? (Make this determination by using the following steps.)

a. Formulate the hypotheses.
b. State the test statistic and the form of the rejection region.
c. With α =.05 determine the rejection region.
d. Calculate the test statistic from the data. The mean and standard deviation were found to be 3246 and 757, respectively.
e. Draw your conclusion (this should include a computation of the P-value). Write the final conclusion as a sentence.

20. (Refer to problem 19.) Along with the determinations of BOD, the discharge of suspended solids (SS) was also monitored at the same site. Samples were taken on 43 days. Do these results strongly support the regulatory agency's claim that the true mean SS is higher than 6000 pounds per day? (Make this determination by using the following steps.)

a. Formulate the hypotheses.
b. State the test statistic and the form of the rejection region.
c. With α =.05 determine the rejection region.
d. Calculate the test statistic from the data. The mean and standard deviation of the 43 determinations of SS were found to be 6301 and 1720 pounds per day, respectively
e. Draw your conclusion (this should include a computation of the P-value). Write the final conclusion as a sentence.