Math 1600, Section 1, Fall 2010 – Statistics
Midterm 2 Review Sheet (Chapters 5, 6, 7, 8) – November 12, 2010

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?

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]

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?

14. (7) In random sampling from a population, with sample size n, mean μ and standard deviation σ:

a. What can we say about the probability distribution of the sample mean $\overline{X}$, if the population distribution is normal? (Hint: you should be able to say something about the expected value and standard deviation.)

b. What can we say about the probability distribution of the sample mean $\overline{X}$, if the population distribution is unknown? (Hint: you should be able to say something about the expected value and standard deviation and how you know what they are.)

15. (8) A company, wishing to improve its customer service, collected the hold times from 75 randomly selected incoming calls to its hotline that were put on hold. Is the claim that μ > 3.0 minutes substantiated by the sample data? (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. With a sample mean hold time $\overline{X}$ = 3.4 minutes and standard deviation of S = 2.4 minutes. Calculate the test statistic from the data.

e. Draw your conclusion (this should include a computation of the P-value and a sentence answering the question above).

16. (8) A forester measures 100 needles off a pine tree and finds $\overline{X}$ = 3.1 centimeters and S = 0.7 centimeter. She reports that a 95% confidence interval for the mean needle length is

$3.1 \pm 1.96 \dfrac{0.7}{\sqrt{100}}$ or (2.96, 3.24) (endpoints are rounded to the nearest hundredth).

a. Is this statement correct?

b. Does the interval (2.96, 3.24) cover the true mean length? Explain.

17. (8) A company's mixed nuts are sold in cans and the label says that 25% of the contents is cashews. Suspecting that this might be an overstatement, an inspector takes a random sample of 35 cans and measures the percent weight of cashews in each can. Do the results constitute strong evidence in support of the inspector's belief? (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. With the sample mean and standard deviation found to be 23.5% and 3.1%, respectively. Calculate the test statistic from the data.

e. Draw your conclusion (this should include a computation of the P-value and a sentence answering the question above).