Winter 2014 Math 227 FINAL Name: _____

Show your work clearly, neatly, and understandably. Make sure you round the decimal for probability to 5-decimal place and round the percentage to 3-decimal.

1. (18:6,5,7) A company that produces cellphone batteries claims its battery lasts at least 35 hours on average. A consumer advocacy group questions that claim since a random sample of 7 batteries from that company has the lifetime of: 32, 35, 30, 31, 38, 34, and 31.

   a. Find $\sum x$ and $\sum x^2$, then the sample mean and sample standard deviation.

   b. Assume that the lifetime of those batteries produced are normally distributed; construct at 99%-CI for the standard deviation of overall batteries lifetime.

   c. Assume that the lifetime of those batteries produced are normally distributed; test the company's claim at 0.05-SL.

2. (19:3,3,3,4,6) The length of calls to Amazon.com customer service is normally distributed with a mean of 15 min and a standard deviation of 4 min.

   a. What portion of calls is between 14.5 min and 17.2 min?

   b. The percentage of calls longer than k minutes is 3%. Find *k*.

   c. A sample of 16 calls is selected at random. Find the probability that less than 8 of them have length between 14.5 min and 17.2 min.

   d. Find the probability that the average length of 16 randomly selected calls is between 14.5 min and 17.2 min.

   e. Find the probability that, of 100 calls, less than 80 with length between 14.5 min and 17.2 min. Find the actual probability and the Normal Approximation probability.

3. (14:3,3,4,4) In a certain school, 75% of the students play in soccer league. Of those who play in the league, 60% are girls. Of those who don't play in the league, 52% are boys.

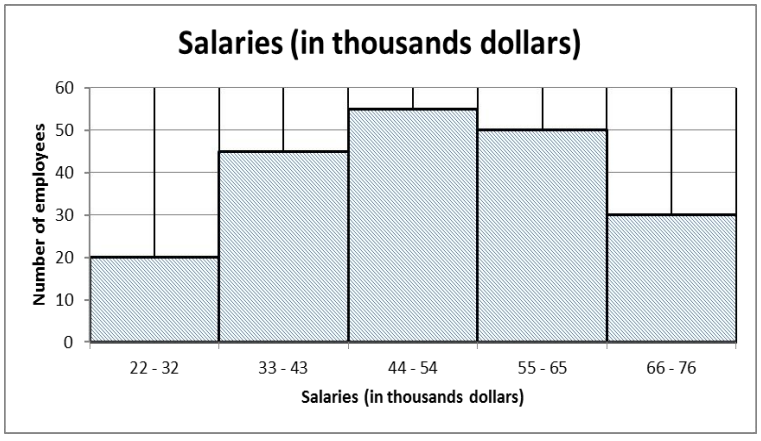
   a. Construct a probability tree diagram corresponds to the information above.

   b. Find the probability that a randomly selected student is a boy.

   c. Find the probability that a randomly selected girl is in the league.

   d. Find the probability that, of 4 randomly selected girls, any of them are in the league.

4. (10:3,3,4) The following is the histogram of the salaries of <u>all</u> the Acme Corporation employees. Construct a frequency distribution corresponds to the histogram, then extend it to compute the mean and standard deviation.



5. (11) A random sample of 25 male financial analysts' salaries resulted in a mean of $77,500 with a standard deviation of $6,000. Another random sample of 18 female financial analysts' salaries resulted in a mean of $72,000 with standard deviation of $9,000. With the assumption that both samples coming from normally distributed population, test the claim that average salary for female analysts is less than the average salary for male analysts. Use $\alpha = 0.05$.

6. (11) A random sample of 175 residents in City A consists of 47 college graduates. Another random sample of 225 residents in City B consists of 81 college graduates. Do these cities have the same percentage of college graduates?

   Test your claim at $\alpha = 0.03$.

7. (12:6,6) A clinic provides a program to help their clients lose weight and asks a consumer agency to investigate the effectiveness of the program. The agency takes a sample of 11 people, weighing each person in the sample before the program begins and 3 months later to produce the following data:

No.	Before	After	d	d^2
1	210	197		
2	205	195		
3	193	191		
4	182	174		
5	259	236		
6	239	226		
7	222	201		
8	211	196		
9	187	181		
10	243	229		
11	246	231		

a. Fill the table above and compute the mean and standard deviation of the differences.

b. Construct a 95%-CI for the mean of all weight loss.

8. (8:5,3) A box contains of 4 red, 3 green, and 2 yellow marbles, all of which are identical except in color. Three marbles are randomly selected without repetition from the box. Construct the probability distribution and extend to find the expected number of red marbles selected.