Fall 2018 Math 227 Test 3 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. There are 106 points available.
MAKE SURE YOU WRITE THE PROBABILITY NOTATION AND THE CALCULATOR NOTATION!!!

1. (21:4,4,4,4,4,5) The SAT Math score is normally distributed with a mean of 500 and standard deviation of 100.
   a. What percentages of the test-takers score more than 570?
   b. If only the top 2% of the test-takers may be considered for a university admission, what is the lowest SAT Math score can apply?
   c. A sample of 30 test-takers is selected at random. Find the probability that at least half of them score less than 570?
   d. A sample of 30 test-takers is selected at random. Find the probability that the average score is more than 570.

e. Find the minimum average score for 30 test-takers to have an average score in the top 1%.

2. (19:4,4,4,5) Forty-six percent of the US population are male. Suppose 5% of all men and 0.4% of women are colorblind.

a. Construct the Tree Diagram of the situation.

b. Find the probability that a randomly selected person is colorblind.

c. Find the probability that a colorblind person is a female.

d. Of 40 colorblind persons, find the probability that at least 30 of them are male.

3. (6:2,4) Let $n = 10, \sum x = 649$, and $\sum x^2 = 49500$. Find the mean and standard deviation. Make sure you use the correct notation.

4. (17:4,6,7) According to a study, the height of adult females in the US is normally distributed with a mean of 167 cm and a standard deviation of 6 cm
   a. What is the probability that the height of a randomly selected adult female is between 160 cm and 170 cm.

   b. If the US Navy sets the height requirement of its applicants the middle 96% of all female, find the minimum and the maximum height of the female applicants. Note: This implies the US Nave will disqualify the shortest and the tallest 2% of all females.

   c. (HARD!) Assume now that the height of Canadian females is also normally distributed with the same standard deviation 6 cm, but an unknown mean. If only 5% of Canadian females are taller than 185 cm, find the mean height of Canadian females.

5. (22:2,5,7,8) The number of people in a car when it gets to a college parking structure is described by the following distribution:

Number of people	*Probability*			
1	0.40			
2	0.25			
3	0.20			
4	0.12			
5				

a. Find the expected number of people in the cars going into the college parking structure. Extend the table above.

b. Find the standard deviation for the number of people in the cars going into the college parking structure. Extend the table above.

c. There are 125 cars currently in the parking structure. Find the probability that the total number of people in the cars going into the college parking structure is more than 180. This implies the average of more than 180/125. Hint: Use Central Limit Theorem.

6. (10:3,7) In an attempt to measure the gestation period of ferrets, thirteen females were observed. The gestation periods for these 10 females were found to be 40, 43, 43, 42, 43, 43, 45, 44, 40, 38 days, respectively.
   a. Find the sample mean.

   b. Find the 95% confidence interval for the mean gestation period of ferrets, if the standard deviation of the gestation period σ = 1.95 days

7. (5) Find the minimum sample size required to estimate an unknown population mean μ, if E= \$126, CL= 99%, σ = \$512

8. (Bonus:6) A CI for μ: $23.87 < \mu < 29.41$. If $\sigma = 1.23$, find CL.