Second Homework

1. The rents of some apartments in New York City are strictly regulated and are not allowed to rise. These are called rent controlled apartments. The rents in a different class of apartment are allowed to rise but the rate of increase is regulated by local housing regulations. These are called rent stabilized apartments. Below are the actual distributions in 2002 of the number of people occupying the two types of apartments.

Number of Persons	Rent Controlled Apartments	Rent Stabilized Apartments
1	0.61	0.41
2	0.27	0.3
3	0.07	0.14
4	0.04	0.11
5	0.01	0.03
6	0	0.01

   a. Calculate the expected value of the number of people living in each type of apartment. Interpret
   b. Calculate the variance and standard deviation of the number of people living in each type of apartment. Interpret

2. Suppose a certain brand of Westinghouse light bulbs has a population life expectancy of 3000 and a population standard deviation equal to 100. (Assume the distribution of the population is normal).
   a. What is the probability that an individually selected light bulb will last fewer than 2950 hours?
   b. What is the probability that a sample of 30 light bulbs will have an average life expectancy of fewer than 2950 hours?
   c. What is the probability an individually selected light bulb will last more than 3225 hours?
   d. Confirm and explain why there is approximately zero chance that a sample of 30 light bulbs will have an average life span greater than 3225 hours.

3. The population mean number of pages for an undergraduate statistics book presently published in the US is 1050 pages. The standard deviation is 300 pages (assume a normal distribution).
   a. What is the probability that a randomly selected text taken from the population will have fewer than 750 pages?
   b. What is the chance that the number of pages in a selected text will be more than two standard deviations above than the population mean?
   c. What is the probability that a randomly selected text will have 1200 or more pages?
   d. What is the probability that a randomly selected text will have fewer than 1300 pages?

4. Sixty-three percent of the undergraduate students at CSULA are female. If I selected a sample of 100 undergraduates from the campus, find the probability the sample proportion will be less than .60.

5. Suppose you want to estimate the proportion of American four-year colleges that have 20,000 or more students. You compile enrollment data for the Cal State campuses.
   a. Calculate the sample proportion of colleges that have over 20,000 students.
   b. Given that you are treating the data as a sample, describe the population.
   c. Explain why we cannot claim that the value calculated in part "a" is a population proportion.
   d. Does the sample of colleges we obtained suggest the method we used to sample from the population is biased?
   e. If the actual population proportion of four-year colleges with over 20,000 students is .155, calculate and interpret the standard deviation of the sample proportion statistic.

6. Assume the population mean number of course hours a CSULA undergraduate takes this quarter is 9.5. The population standard deviation is 3.5 hours.
   a. If a sample of 30 students were taken, what's the probability the sample mean would fall within one course hour of the population mean?
   b. If a sample of 60 students were taken, what's the probability the sample mean would fall within one course hour of the population mean?
   c. Explain why the probability calculated in part b is larger than for part a.
   d. How is it that we can assume the distribution of the sample mean is normal in this case?

7. Suppose you survey 81 adult American males and record a mean weight of 194 pounds. The sample standard deviation is 35 pounds.
   a. From the information given describe the population whose mean you are estimating.
   b. Construct a 99% confidence interval for the population mean. Interpret.
   c. Suppose a prominent doctor contends that adult American males have a population mean weight of 220 pounds. Does the sample evidence support the doctor's hypothesis?

8. Ace Rental Cars is interested in estimating the mean number of miles its cars are driven on the 4th of July holiday. From the 25,000 cars it owns, the company's statistician selects 200 cars rented for the 4th and records the mileage for each car. The calculated sample mean is 54.5 miles and the standard deviation is 65 miles.
   a. Define what the population mean is. What exactly is the sample mean estimating?
   b. Construct a 95% confidence interval for the population mean. Interpret.
   c. Construct a 90% confidence interval; interpret and compare to the interval constructed for part b above.

9. Assume the owner of a warehouse, located in an active earthquake zone, wants to purchase earthquake insurance. The warehouse is valued at one million dollars. The insurance adjustor will base the yearly insurance premium on the probability distribution below. The variable X represents the loss to the building.

Event (in a given year)	**X**	**P(X)**
Warehouse is not affected by earthquake	_____	0.93
Warehouse is 25% destroyed by earthquake	_____	0.03
Warehouse is 50% destroyed by earthquake	_____	0.01
Warehouse is 75% destroyed by earthquake	_____	0.02
Warehouse is totally destroyed by earthquake	_____	_____

a. Fill in the table
b. Calculate and interpret the expected value of X, E(X)
c. $P(X>500{,}000)=$
d. $P(X\leq 750{,}000)=$