Review Problems

This is a list of review problems for those of you that want to practice for the exam. However, these problems ***do not cover all the material*** *you need to study for the final.*

1. Describe which measure of central tendency -mean or median- was probably used in each case:

   (a) One-half of the factory workers make more than \$5.37 per hour and one-half make less than \$5.37 per hour.

   (b) The average number of children per family in the Plaza Heights Complex is 1.8.

   (c) The average age of college professors is 42.3 years.

2. Pearson and Lee obtained the following results for about 1,000 men:
   Average Height $\approx$ 69 inches SD $\approx$ 2.5 inches
   Average Forearm Length $\approx$ 18 inches SD $\approx$ 1 inch
   with correlation coefficient $r = 0.8$.

   (a) Compute the regression line for predicting Height from Forearm Length. What is the response and what is the predictor?

   (b) Predict the height for a man whose Forearm Length is 20 inches.

   (c) Give the statistical interpretation for the slope and the intercept of the regression.

3. For women age 25-29 in California, the relationship between income and education can be summarized as follows:
   Average Education $\approx$ 12 years SD $\approx$ 3.5 years
   Average Income $\approx$ \$11,600 SD $\approx$ \$10,500
   with correlation coefficient $r = 0.4$. The scatter diagram looks like a football shaped cloud.

   (a) Compute the regression line for predicting income from education. What is the response and what is the predictor?

   (b) Predict the income for a woman who studied 10 years.

   (c) Give the statistical interpretation for the slope and the intercept of the regression.

4. At a local university 54.3% of incoming first-year students have computers. If 3 students are selected at random, find the probability that

   (a) None have computers

   (b) At least one has a computer.

   (c) All have computers.

5. The Bargain Auto Mall has the following cars in stock:

	SUV	Compact	Mid-sized
Foreign	20	50	20
Domestic	65	100	45

   Are the events "compact" and " domestic" independent? Explain.

6. A survey for Teenage Research Unlimited found that 30% of teenage consumers receive their spending from part-time jobs. If 5 teenagers are selected at random, find the probability that at least 3 of them will have part-time jobs.

7. An insurance company insures a person's antique coin collection worth $20,000 for an annual premium of $300. If the company figures that the probability of the collection being stolen is 0.0002, what will be the company's expected profit?

8. The average amount of rain per year in Greenville is 49 inches. The SD is 8 inches. Find the probability that next year in Greenville will receive the following amount of rainfall (assuming that the variable is normally distributed):

   (a) At most 55 inches

   (b) At least 62 inches

   (c) Between 46 and 54 inches

   (d) How many inches of rain would you consider to be an extremely wet year?

9. The average annual salary in Pennsylvania was $24,393 in 1992. Assume that the salaries were normally distributed for a certain group of wage earners, and the standard deviation of the group was $4362.

   (a) Find the probability that a randomly selected individual earned less than $26,000.

   (b) Find the probability that, for a randomly selected sample of 35 individuals the mean salary was less than $26,000.

10. A survey found that the American family generated an average of 17.2 pounds of glass garbage each year. Assume that the standard deviation of the distribution is 2.5 pounds. Find the *approximate* probability that the mean of a sample of 55 families will be between 17 and 18 pounds.

11. The average price of a pound of sliced bacon is $2.02. Assume that the standard deviation is $0.08. If a random sample of 40 one-pound packages is selected, find the *approximate* probability that the mean of sample will be less than $2.00.

12. Determine whether each statement is true or false. If the statement is false, explain why.

    (a) Interval estimated are preferred over point estimates since a confidence level can be specified.

    (b) For a specific confidence interval, the larger the sample size, the smaller the margin of error will be.

    (c) To determine the sample size needed to estimate a parameter, one must know the margin of error.

13. The average weight of 40 randomly selected minivans was 4150 pounds. The SD was 480 pounds. Find a point estimate of the population mean. Find the 99% confidence interval of the true mean weight of the minivans.

14. The speed of light is measured 25 times by a new procedure. The 25 measurements are recorded and show no trend or pattern. Then the investigators work out the average SD of the 25 numbers; the average is 299,789.2 kilometers per second and the SD is 12 kilometers per second.

    (a) Find a 95% confidence interval for the speed of light.

    (b) Now the investigators measure the speed of light 26 times by the same procedure and get 299,781 kilometers per second. Is this a surprising result?

15. A large number of measurements one standard kilogram have established that our weighing procedure gives an average which is 500 micrograms too high, with an SD of 10 micrograms. We have just been sent a new checkweight which we have been asked to weigh. The owners of this checkweight specify that they wish the weight we report to be accurate to within 1 micrograms. We reply that we can't guarantee that, but we are prepared to guarantee that our answer will be accurate to within 1 micrograms 95% of the time. How many measurements do we need to take?

16. A recent study of 75 workers found that 53 people rode the bus to work every day. Find the 95% confidence interval of the proportion of all workers who rode the bus to work.

17. A recent study found that 64.7% of the population own their homes. In a random sample of 150 heads of households, 92 responded that they ownedtheir homes. At the 0.01 level of significance, does that indicate a difference from the national proportion?

18. A car dealer recommends that transmissions be serviced at 30,000 miles. To see whether her customers are adhering to this recommendation, the dealer selects a sample of 40 customers and finds that the average mileage of the automobiles serviced is 30,456. The SD of the sample is 1684 miles. By finding the p-value determine whether the owners are having their transmissions serviced at 30,000 miles. Use $\alpha = 0.1$. Do you think the α value of 0.10 is an appropriate significance level?

19. An educator estimated the dropout rate for seniors at high-schools in California is 15%. Last year, 38 seniors from a random sample of 200 California seniors withdrew. At $\alpha = 0.05$, is there enough evidence to reject the educator's claim?