

Elementary Statistics
Test 3
Fall 2009

Name:
 $12+10+4+10+10+10+10+10+10+14 = 100$

- 1 Let a random variable X have a distribution (not necessarily normal) with mean 81 and standard deviation of 12. Assume the population is infinite. Consider taking a sample of size of 64.

Answer the following questions.

- (a) What is the distribution of \bar{X} ?
- (i) Shape or a name.
 - (ii) Mean.
 - (iii) Standard error of the mean.

Hint: Parts (ii) and (iii) require numerical answers.

- (b) What is the name of the theorem you used in part 2?
- (c) Find $P(\bar{X} < 84)$. **Also** draw a graph and shade the area of interest.

- 5 A park ranger wants to know the average size of trout taken from a certain lake. How large a sample of trout must be taken to be able to assert with probability of 98% that a sample mean will not be off by more than half (0.5) an inch. Assume that it is known the standard deviation is 2.5 inches.
- 6 A hospital wants to estimate the mean number of blood tests given to patients each day. Hospital records show that a randomly selected sample of 90 days, the average number of blood tests was 85, with a standard deviation of 9.2. Construct a 95% confidence interval for the mean number of blood tests given to patients each day.
- 7 If a random sample of 6 students took on the average 20.3 minutes with a standard deviation of 2.5 to complete the registration forms for courses offered in the next semester, construct a 95% confidence interval for the mean time that it takes to complete such registration forms.

- 8 In a sample survey, 140 out of 500 persons interviewed in a large city said that they shop in the downtown area at least once a week. Construct a 90% confidence interval for the corresponding true proportion.
- 9 In a sample survey, 320 of 1000 persons interviewed in a large city said that they shop in the downtown area at least once a week. What can we say with 99% confidence about the maximum error if we use the sample proportion to estimate the true proportion?

- 10 A large personal computer manufacturer wants to determine from a sample, what proportion of households intend to purchase personal computers within the next 12 months.
- (a) How large a sample will the manufacturer need to be able to assert with a probability of 95% that the sample proportion will not differ from the true proportion by more than 0.05?
 - (b) Redo the problem if you know the true proportion is between 0.1 and 0.2. (Give your best try. I will be easy on grading part (b))