Worksheet 8.4 Name _____

Sampling Distributions
(Proportions and Means)

1. About 75% of young adult Internet users (ages 18 to 29) watch online video. Suppose that a sample survey contacts an SRS of 1000 young adult Internet users and calculates the proportion $\hat{p}$ in this sample who watch online video.

a. What is the mean of the sampling distribution of $\hat{p}$?

b. Find the standard deviation of the sampling distribution of $\hat{p}$. Check that the 10% condition is met.

c. Is the sampling distribution approximately Normal? Check that the Normal conditions are met.

d. If the sample size were 9000 rather than 1000, how would this change the sampling distribution of $\hat{p}$?

e. What is the probability, in an SRS of 1000 young adults, that between 71% and 77% of them watch videos online?

2. A USA Today Poll asked a random sample of 1012 U.S. adults what they do with the milk in the bowl after they have eaten the cereal. Of the respondents, 70% said that they drink it. Let $\hat{p}$ be the proportion of people in the sample who drink the cereal milk.

a. What is the mean of the sampling distribution of $\hat{p}$?

b. Find the standard deviation of the sampling distribution of $\hat{p}$. Check that the 10% condition is met.

c. Is the sampling distribution approximately Normal? Check that the Normal conditions are met.

d. Find the probability of obtaining a sample of 1012 adults in which 67% or fewer say they drink the cereal milk.

3. Your mail-order company advertises that it ships 90% of its orders within three working days. You select an SRS of 100 of the 5000 orders received in the past week for an audit.

a. What is the mean of the sampling distribution of $\hat{p}$?

b. Find the standard deviation of the sampling distribution of $\hat{p}$. Check that the 10% condition is met.

c. Is the sampling distribution approximately Normal? Check that the Normal conditions are met.

d. The audit reveals that 86 of theses orders were shipped on time (that is 86%). What is the probability that the proportion of on time orders is 86% or less?

4. The composite scores of individual students on the ACT college entrance examination in 2009 followed a Normal distribution with mean 21.1 and standard deviation 5.1.

a. What is the probability that a single student randomly chosen from all those taking the test scores 23 or higher?

b. Now take an SRS of 50 students who took the test. What is the probability that he mean score of theses students is 23 or higher? Why are we allowed to use the Normal approximation?

5. The Wechsler Adult Intelligence Scale (WAIS) is common "IQ test" for adults. The distribution of WAIS scores for persons over 16 years of age is approximately Normal with mean 100 and standard deviation 15.

a. What is the probability that a randomly chosen individual has a WAIS score of 105 or higher?

b. Find the mean and standard deviation of the sampling distribution of the average WAIS score for an SRS of 60 people.

c. What is the probability that the average WAIS score of an SRS of 60 people is 105 or higher?

d. Would your answer to a, b, or c be affected if the distribution of WAIS scores in the adult population were distinctly non-Normal? Explain.

6. The gypsy moth is a serious threat to oak and aspen trees. A state agriculture department places traps throughout the state to detect the moths. When traps are checked periodically, the mean number of moths trapped is only 0.5, but some traps have several moths. The distribution of moth counts is discrete and strongly skewed, with standard deviation 0.7.

a. What are the mean and standard deviation of the average number of moths in 50 traps?

b. Can we use the normal approximation for this sampling distribution? Why or why not?

c. What is the probability that he average number of moths in 50 traps is greater than 0.6?