

1. A recent survey of STAT 201 students showed that 60% prefer a black pen to write with. For this problem, assume that 60% of all STAT 201 students prefer a black pen.

- a. For a random sample of size  $n = 40$  STAT 201 students, find the mean and standard error of the sampling distribution of the sample proportion of students that prefer a black pen.
- b. Is it safe to assume that the distribution of sample proportions is bell shaped? Why or why not?
- c. For a sample of 40 students, 20 prefer a black pen. Calculate the z-score for this observation.

2. According to Cellular-News, American households spend an average of \$524 per year on cell phones (source: <http://www.cellular-news.com/story/28056.php>). Assume the standard deviation is \$150.

- a. What is the mean and standard error of the sampling distribution of the sample mean amount of money spent on cell phones per year for  $n = 64$  households?
- b. Is it safe to assume that the distribution of sample means is bell shaped? Why or why not?
- c. What is the probability that the mean annual spending for 64 households is less than \$500?

3. In a study at the University of Arizona, a sample of 85 grocery carts showed that 72% had fecal-bacteria on the handle (source: <http://www.abc2news.com/dpp/news/health/fecal-bacteria-found-on-grocery-carts>). Assume that the 85 carts were randomly selected from all grocery carts in the United States. Is there evidence, at the .05 level of significance, that more than 60% of US grocery carts have fecal-bacteria on the handle?

a. Check the assumptions

b. Write the null and alternative hypothesis

c. Calculate the test statistic

d. Find the p-value

e. Make a decision and write a thorough interpretation.

4. In a survey of 48 STAT 201 students, 27 reported that they opted to buy the e-book instead of the traditional textbook. Assume that the students were randomly selected.

- a. Calculate a 99% confidence interval for the proportion of all STAT 201 students who purchase the e-book instead of the traditional textbook.
- b. Write a thorough interpretation of the confidence interval.
- c. Can we conclude that a majority of STAT 201 students prefer to buy only the e-book? (2 points)
- d. Name **two** ways to reduce the width of the confidence interval. (3 points)