

Place work on your own paper. Work should include correct notation, formula with values included, final answer and sketch (when appropriate).

1. The average spending for a gym membership by a random sample of 150 students at a university is \$125, with a standard deviation of \$30. Construct a 95% confidence interval estimate for the average expense of all university students on gym membership. You may assume that the membership costs are normally distributed.
2. You are trying to estimate the number of high school students with iPhones. A random sample of 100 students reveals that 35 of them have an iPhone. Estimate the percentage of all high school students who have iPhones with 98% confidence.
3. The mean life span of a brand name tire is 50,000 miles. Assume that the life spans of the tires are normally distributed, and the population standard deviation is 800 miles.
 - a. If you select one tire, what is the probability that its life span is less than 48,500 miles?
 - b. If you select 100 tires, what is the probability that their mean life span is more than 50,200 miles?
4. An appliance manufacturer stockpiles washers and dryers in a large warehouse for shipment to retail stores. Sometimes, in handling, the appliances get damaged. Even though the damage may be minor, the company must sell those machines at drastically reduced prices. One day an inspector randomly checks 60 washers and finds that 5 of them have scratches or dents. Compute a 95% confidence interval for the proportion of appliances from this manufacturer that get damaged during shipment.
5. A bottling company uses a filling machine to fill plastic bottles with a popular cola. The bottles are supposed to contain 300 ml. In fact, the contents vary according to a normal distribution with mean = 303 ml and standard deviation = 3 ml.
 - a. What is the probability that an individual bottle contains less than 300 ml?
 - b. Now take a random sample of 10 bottles. What are the mean and standard deviation of the sample mean contents \bar{x} of these 10 bottles?
 - c. What is the probability that the sample mean contents of the 10 bottles is less than 300 ml?