Terms and concepts to know:

law of large numbers
central limit theorem
sample
statistic
parameter
population
sampling variability
sampling distribution
biased
unbiased
random
normal distribution
skewed distribution
symmetric distribution
uniform distribution
approximately normal
exactly normal
conditions for
variability of a statistic
rule of thumb 1 and rule of thumb 2
the mean of a sampling distribution
the standard deviation of a sampling distribution

Ch. 9 review

A medical study found that 20% of its participants had a particular genetic defect. It is believed that in the general population, only 10% have this defect. Identify the parameter, the statistic, the sample, and the population.

In a certain large population, 70% of people have blond hair. An SRS of 50 people is taken and the sample proportion is calculated. The mean of the sampling distribution of the sample proportion is...

If a population has a standard deviation 20, then the standard deviation of the sampling distribution of the sample mean for samples of 25 randomly selected people from this population is...

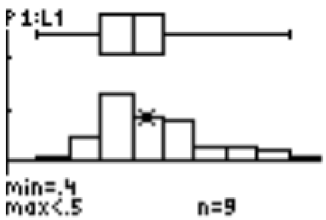
The distribution of all values taken by a statistic in all possible samples of the same size from the same population is called...

If the mean of the sampling distribution of a statistic is not equal to the actual value of the parameter that we are estimating, then the statistic is called...

Suppose that in an SRS of 2000 French citizens, 10% own a certain car model and in an SRS of 2000 American citizens, 12% own this car model. Compare the sampling variability associated with these statistics. (see page 499)

You roll a die 20 times and find the proportion of 5's that come up to be 0.4. A classmate is concerned that the die may be "loaded". Do you agree or disagree?

Suppose that you now roll that same die another 20 times and find the proportion of 5's. You repeat this again and again until you have found the sample proportion $\hat{p}$ 50 times total. You make a histogram on the TI-83 and a boxplot for the same data. What do you say to your classmate now? Interpret these results.



Suppose that AAA surveyed a random sample of 2500 cars in California, checking the air pressure in the front passenger side tire. Let $\hat{p}$ be the proportion in the sample that had low pressure and suppose that 70% of all such tires in California are low.

a. If $\hat{p}$ is the proportion of a sample with low pressure, find the mean of $\hat{p}$.

b. What is the standard deviation of $\hat{p}$?

c. Why can we use the formula we did in part b?

d. Check the conditions for a normal approximation for the distribution of $\hat{p}$.

e. Find the probability that $\hat{p}$ takes a value between 0.68 and 0.72 (use normal approximation).

f. How large a sample would be needed to guarantee that the standard deviaion of $\hat{p}$ is no more than .001? Show your work.

g. Can you calculate the probability that a single randomly selected tire is low? If so, do it. If not, explain why not.

A pharmacist is accused of diluting medication and yet charging full price. The pharmaceutical company says that 5 ounce bottles of the medication should contain an average of 240 grams of active ingredient with a standard deviation of 20 grams.

a. Find the probability that a random sample of 60 of these 5 ounce bottles of medication will have a sample mean of 215 grams or less of the active ingredient. Sketch this distribution.

b. Suppose that 35 laboratories are each sent a random sample of 60 of these 5 ounce bottles and each determines the mean grams of active ingredient. Describe the shape of the distribution for these 35 values of $\overline{x}$. What principle from chapter 9 tells you this?

c. Use the 68-95-99.7 rule to estimate the interval that contains 99.7% of the values of $\overline{x}$ in the sampling distribution of $\overline{x}$.

d. Can you calculate the probability that a single randomly selected 5 ounce bottle of the medication contains 215 grams or less of the active ingredient? If so, do it. If not, explain why not.

e. How large a sample would you need to guarantee that the standard deviation of x would be 2 grams or less?

f. Would your answers to parts a through c change if you knew that the distribution of grams of active ingredient in 5 ounce bottles were definitely not normal?