

Sampling Distributions: Population Proportions

In a survey, 34% of the respondents stated that they talk to their pets on the answering machine or telephone. A veterinarian believed this result to be too high, so she randomly selected 250 pet owners and discovered that 65 of them spoke to their pet on the answering machine or telephone.

Condition check

Find the sample percentage $\hat{p} = \frac{\text{number of successes}}{\text{sample size}} = \frac{65}{250} * 100 =$

The population percentage of pet owners who talk to their pets on the phone is a _____ This number is _____ it is represented by P

Find the standard deviation

Formula

Calculation

Assume the population percentage is true. Make a sketch:

Use the David Lane Normal calculator to find the probability

Does the veterinarian have a right to be skeptical? Why?

37% of adults with children under the age of 18 previously reported that their family ate dinner together 7 nights a week. Suppose in a recent poll, 374 of 1050 adults with children under the age of 18 reported that their family ate dinner together 7 nights a week. Is there sufficient evidence that the proportion of families with children under the age of 18 who eat dinner together 7 nights a week has decreased.

Condition check

Find the sample percentage $\hat{p} =$

P is the percentage of _____

Find the standard deviation

Formula

Calculation

Assume the population percentage is true. Make a sketch:

Use the David Lane Normal calculator to find the probability

Has the percentage of families who eat dinner together 7 nights per week decreased?

About 10% of the human population is left-handed. Suppose that a researcher speculates that artists are more likely to be left-handed than are other people in the general population. The researcher surveys 150 artists and finds that 18 of them are left-handed.

Condition check

Find the sample percentage $\hat{p} =$

P is the percentage of _____

Find the standard deviation

Formula

Calculation

Assume the population percentage is true. Make a sketch:

Use the David Lane Normal calculator to find the probability

Are artists more likely to be left handed?

The American Automobile Association (AAA) claims that 54% of fatal car/truck accidents are caused by driver error. A researcher studies 30 randomly selected accidents and finds that 14 were caused by driver error.

Condition check

Find the sample percentage $\hat{p} =$

P is the percentage of _____

Find the standard deviation

Formula

Calculation

Assume the population percentage is true. Make a sketch:

Use the David Lane Normal calculator to find the probability

Is the researcher wrong in saying that fewer than 54% of accidents are caused by driver error?

Sampling distributions for means:

A pain reliever currently being used in a hospital is known to bring relief to patients in a mean time of 3.5 minutes with a standard deviation of 1.14 seconds.

To compare a new pain reliever with one currently being used, the new drug is administered to a random sample of *fifty* patients. The mean time to relief for the sample patients is 3.2 minutes.

Condition check

What is the sample size?

Standard deviation for the sampling distribution for samples of size 50:

Formula

Calculation:

Make a sketch:

Use the David Lane Normal calculator to find the probability

The probability of get a sample of _____ patients with a mean time to relief of _____ is _____ if the new drug doesn't work any better than the old drug.

The mean monthly cellular telephone bill in 2010 was \$40.24, according to the Cellular Telecommunications Industry Association. A researcher at CTIA claims that the average monthly bill has increased since then. She conducts a survey of 49 cellular phone users and determines the mean bill to be \$45.15. Assume that the std dev = \$21.20.

Condition check

What is the sample size?

Standard deviation for the sampling distribution for samples of size 49:

Formula

Calculation:

Make a sketch:

Use the David Lane Normal calculator to find the probability

The probability of get a sample of _____ telephone bills with a mean of _____ is _____ if cost has not increased.

The Environmental Protection Agency publishes data regarding the miles per gallon of all cars. A researcher claims that fuel additives increase the miles per gallon of cars driven under highway driving conditions. The mean miles per gallon of all large cars manufactured in 2009 without the fuel additive is 25.1 with a std. dev. of 3.9 miles, on the basis of data obtained from the EPA. The researcher obtains a simple random sample of 35 large cars manufactured in 2009 and adds a fuel additive. The sample mean is determined to be 26.8 miles per gallon. Based on this data, how convinced are you that the fuel additive increased car mileage?

Condition check:

What is the sample size?

Standard deviation for the sampling distribution for samples of this size

Formula

Calculation:

Make a sketch:

Use the David Lane Normal calculator to find the probability

Make a statement

The probability of get a sample of _____ cars with an average mileage of _____ is _____ if the additive did not work.

A researcher claims that the average age of a woman before she has her first child is greater than the 1990 mean age of 26.4 years, on the basis of data obtained from the National Vital Statistics Report, Vol. 48, No. 14. She obtains a simple random sample of 40 women who gave birth to their first child in 1999 and finds the sample mean age to be 27.1 years. Assume that the standard deviation is 6.4 years. Are you convinced the average age has increased?

Condition check

What is the sample size?

Standard deviation for the sampling distribution for samples of this size

Formula

Calculation:

Make a sketch:

Use the David Lane Normal calculator to find the probability

Make a statement