Forms of Inference

We introduce three forms of statistical inference in this unit, each one representing a different way of using the information obtained in the sample to draw conclusions about the population. These forms are:

- Point estimation
- Interval estimation
- Hypothesis testing

Obviously, each one of these forms of inference will be discussed at length in this section, but it would be useful to get at least an intuitive sense of the nature of each of these inference forms, and the difference between them in terms of the type of conclusions they draw about the population based on the sample results.

In **point estimation**, we estimate an unknown parameter using a *single number* that is calculated from the sample data.

Example

Based on sample results, we estimate that p, the proportion of all U.S. adults who are in favor of stricter gun control, is 0.6.

In **interval estimation**, we estimate an unknown parameter using an **interval of values** that is likely to contain the true value of that parameter (and state how confident we are that this interval indeed captures the true value of the parameter).

Example

Based on sample results, we are 95% confident that p, the proportion of U.S. adults who are in favor of stricter gun control, is between 0.57 and 0.63.

In **hypothesis testing**, we have some claim about the population, and we check **whether or not the data** obtained from the sample **provide evidence against this claim.**

Example: 1

It was claimed that among all U.S. adults, about half are in favor of stricter gun control and about half are against it. In a recent poll of a random sample of 1,200 U.S. adults, 60% were in favor of stricter gun control. This data, therefore, provides some evidence against the claim.

Example: 2

It is claimed that among drivers 18-23 years of age (our population) there is no relationship between drunk driving and gender. A roadside survey collected data from a random sample of 5,000 drivers and recorded,their gender and whether they were drunk. The collected data showed roughly the same percent of drunk drivers among males and among females. These data, therefore, do not give us any reason to reject the claim that drunk driving is not related to gender.

Did I Get This

1/1 point (graded)

In this scenario, a conclusion is drawn about a population based on the sample results. Select which form of statistical inference this conclusion represents.

Based on a recent poll of 1,015 U.S. households that have an Internet connection, the researchers claimed with 95% confidence that among all U.S. households that have an Internet connection, between 63% and 67% have a high-speed link.

- ○ point estimation
- ◉ interval estimation ✔
- ○ hypothesis testing

Answer

Correct:

The proportion of households with an Internet connection that have a high-speed link is estimated to be (with 95% confidence) somewhere in the interval between 63% and 67%.

Submit

Did I Get This

1/1 point (graded)

In this scenario, a conclusion is drawn about a population based on the sample results. Select which form of statistical inference this conclusion represents.

A company that provides coaching for the SAT claims in one of its ads: "90% of our students improve their SAT scores after attending our course." To check the company's claim, 500 students who took the company's course were sampled, and it was found that 407 of them (81.4%) actually improved their SAT scores after attending the course. Based on the sample results, we have some serious doubts regarding the accuracy of the company's claim.

- point estimation
- interval estimation
- hypothesis testing ✔

Answer

Correct:

In this case, we have a claim, and we are using the data collected from a sample to assess its accuracy.

Submit

Did I Get This

1/1 point (graded)

In this scenario, a conclusion is drawn about a population based on the sample results. Select which form of statistical inference this conclusion represents.

In a recent study, 1,115 males 25 to 35 years of age were randomly chosen and asked about their exercise habits. Based on the study results, the researchers estimated that the mean time that a male 25 to 35 years of age spends exercising in a week is about 3.5 hours.

- point estimation ✔
- interval estimation

hypothesis testing

Answer
Correct:
Correct Here we are using the data to estimate the mean time (our parameter) using a single number: 3.5 hours.

Submit

Did I Get This

1/1 point (graded)
In this scenario, a conclusion is drawn about a population based on the sample results. Select which form of statistical inference this conclusion represents.

A recent poll asked a random sample of 1,100 U.S. adults whether or not they support gay marriage. Based on the results of the poll, the pollsters estimated that the proportion of all U.S. adults who support gay marriage is 0.61. Which form of statistical inference should you use to evaluate this conclusion?

- point estimation ✔
- interval estimation
- hypothesis testing

Answer
Correct:
We are using the data to estimate the proportion of all U.S. adults who support gay marriage by a single number: 0.61.

Submit

Did I Get This

1/1 point (graded)
In this scenario, a conclusion is drawn about a population based on the sample results. Select which form of statistical inference this conclusion represents.

A blurb on a box of brand X lightbulbs claimed that the mean lifetime of each lightbulb is 750 hours. A random sample of 36 light bulbs was tested in a laboratory, and it was found that their average lifetime is 745 hours. Which form of statistical inference should you use to evaluate whether the data provide enough evidence against the advertised mean lifetime on the box?

- point estimation
- interval estimation
- hypothesis testing ✔

Answer
Correct:
We are assessing whether the data provide enough evidence against the claim that the mean lifetime is 750 hours.

Submit

Did I Get This

1/1 point (graded)
In this scenario, a conclusion is drawn about a population based on the sample results. Select which form of statistical inference this conclusion represents.

Based on data collected from a random sample of 1,200 college freshmen, researchers are 95% confident that the mean number of sleep hours of all college freshmen is between 6 hours and 7.5 hours. Which form of statistical inference should you use to evaluate this conclusion?

- point estimation
- interval estimation ✔
- hypothesis testing

Answer
Correct:
We are estimating the mean number of daily sleep hours of college freshmen by an interval of values (6 to 7.5 hours).

Submit

In terms of organization, Inference consists of two main parts: Inference for One Variable and Inference for Relationships between Two Variables. The organization of each of these parts will be discussed further as we proceed through the Inference sections.
