Learning Goal: Recognize situations where statistical inference is, and is not, appropriate.

Introduction: We are now transitioning into the last part of the course: statistical inference. Let's briefly discuss the difference between descriptive statistics (the early part of this course) and inferential statistics.

Differences between Descriptive and Inferential Statistics

For descriptive statistics, we choose a group that we want to describe and then measure all subjects in that group. The statistical summary describes this group with complete certainty. For example, we can calculate the mean height of first graders at the local elementary school.

For inferential statistics, we define the population and then devise a sampling plan that produces a representative sample from the population. For example, we might want to estimate the mean height of first graders statewide by selecting a random sample of first graders from across the state.

A study using descriptive statistics is simpler to perform. However, if you need evidence that an effect or relationship between variables exists in an entire population rather than only your sample, you need to use inferential statistics.

With inferential statistics the statistical results incorporate the uncertainty that is inherent in using a sample to understand an entire population. Describing this uncertainty is where probability comes in. Because probability is involved, a statistical study involves data that comes from some random process, such as random sampling or random assignment.

In statistical inference, we will use probability density curves. These curves are mathematical models that represent the long-run behavior of random samples. With these models we will be able to describe and quantify the potential error in a random sample and the uncertainty we may have in the inference about a population that is based on a single random sample.

Check your understanding:

Which of the following studies involve statistical inference?

a) Who is the better homerun hitter: Barry Bonds or Babe Ruth?
b) Is the Contra Costa school bond measure expected to pass in the next election?
c) Is there a relationship between political party affiliation and views on gun control in the United States?
d) Is there a relationship between gender and views on vaping in our class?
e) What percentage of customers expect name brands to provide customer service on Facebook?