Inferential Statistics

The scope of reality can be vast. Historically, the ozone layer over most of the Earth's surface is about 3 millimeters thick. A problem such as trying to assess the ozone thickness over the entire surface of the earth at a point in time would be an impossible sample space to measure. There is no way to know the actual thickness of the ozone layer except by an inductive process: namely sampling, data collection, and statistical inference.

Thickness of the Ozone Layer

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The length of this line segment is 3mm, which is the approximate size of the ozone layer.

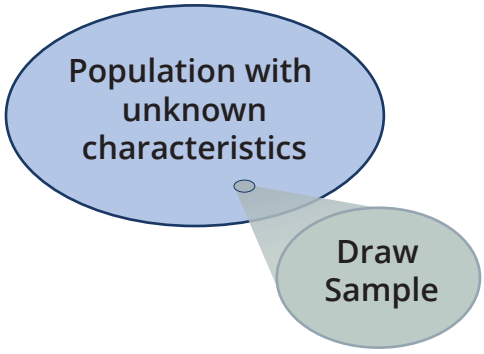

Figure 1.3.1

Inferential statistics is about estimating and making inferences (empirically supported judgments) about population parameters. It is a classical application of inductive reasoning. Increasing the sample size tends to improve the precision and reliability of the estimated population parameters.

Inferential Statistics

The objective of **inferential statistics** is to make reasonable estimates of population characteristics using sample data.

DEFINITION

If data were free, it would be preferable to have measurements of the entire population, but in most cases the required data is either not obtainable or would be much too costly to obtain. For example, to be absolutely certain that all car air bags will work satisfactorily when needed would require each new car to be crash tested. If 100 percent testing were a requirement, cars with air bags would be a scarce commodity. Fortunately for automobile manufacturers, statistical sampling techniques can reliably estimate, with a high degree of confidence, what fraction of air bags that will inflate.

1.3 Exercises

Basic Concepts

1. Is inferential statistics a deductive or inductive process?
2. What is the difference between descriptive and inferential statistics?