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Sampling Distributions



Introduction

Already on several occasions we have pointed out the important distinction between a **population** and a **sample**. In Exploratory Data Analysis, we learned to summarize and display values of a variable for a **sample**, such as displaying the blood types of 100 randomly chosen U.S. adults using a pie chart, or displaying the heights of 150 males using a histogram and supplementing it with the sample mean (\bar{X}) and sample standard deviation (S).

In our study of Probability and Random Variables, we discussed the long-run behavior of a variable, considering the **population** of all possible values taken by that variable. For example, we talked about the distribution of blood types among all U.S. adults and the distribution of the random variable X , representing a male's height. In this module, we focus directly on the relationship between the values of a variable for a **sample** and its values for the entire **population** from which the sample was taken. This module is the bridge between probability and our ultimate goal of the course, statistical inference. In inference, we look at a sample and ask what we can say about the population from which it was drawn. In this module, we'll pose the reverse question: If I know what the population looks like, what can I expect the sample to look like? Clearly, inference poses the more practical question, since in practice we can look at a sample, but rarely do we know what the whole population looks like. This module will be more theoretical in nature, since it poses a problem which is not really practical, but will present important ideas which are the underpinnings for statistical inference.

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