CHAPTER OVERVIEW

10: Probability

Learning Objectives

- Describe the sample space for a selected random experiment.
- Compute relative frequency and empirical probability for a given set of events
- Compute probabilities of single events, complementary events, and the unions and intersections of collections of events.
- Describe the law of large numbers.
- Describe the difference between a probability and a conditional probability
- Describe the concept of statistical independence
- Use Bayes' theorem to compute the inverse conditional probability.

Probability theory is the branch of mathematics that deals with chance and uncertainty. It forms an important part of the foundation for statistics, because it provides us with the mathematical tools to describe uncertain events. The study of probability arose in part due to interest in understanding games of chance, like cards or dice. These games provide useful examples of many statistical concepts, because when we repeat these games the likelihood of different outcomes remains (mostly) the same. However, there are deep questions about the meaning of probability that we will not address here; see Suggested Readings at the end if you are interested in learning more about this fascinating topic and its history.