STAT324: Introductory Applied Statistics for Engineers	Spring 2019

Chapter 3 — Probability Summary

1. Probability vs. Statistics

   - A **random sample** is a special kind of sample where there is some uncertainty as to which members of the population will be selected.

   - **Probability** takes information about a population, and allows us to make statements about what a random sample taken from that population might look like.

   - **Statistics** takes information about a random sample, and seeks to make inference about the properties of the population from which the random sample was drawn.

   - A numerical property of a population is often called a **population parameter**, or simply a **parameter**.

2. Probability

   - A **random process** is any process that generates data in which the result has some amount of random chance or uncertainty involved.

   - An **outcome** is a distinct result of a random process.

   - An **event** is a collection of outcomes.

   - Three properties of probability:

      (1) For a random process with a finite set of possible outcomes, the probability of an event is the sum of the probabilities of the outcomes that comprise that event.

      (2) For a random process with a finite set of possible outcomes, the probability of an event is always between 0 and 1. A probability of exactly 0 indicates the event will never happen no matter how many times the random

      (3) As a result of properties (1) and (2), the probability that an event does not occur must always be one minus the probability that it does occur.

   - Two events are said to be **independent** if the observed outcome of the first event does not change the probability of the second event, or vice versa. If two events are not independent, we call them **dependent**.

   - If two events are independent, then the probability that they both occur is the product of the individual probabilities of the events.