STAT 2857A – Lecture 2 Examples and Exercises

Example 2.1

Suppose that the sample space, $\mathcal{S}$, contains $N > 2$ outcomes and we assign each event $A \subset \mathcal{S}$ probability

$$P(A) = \left(\frac{N(A)}{N}\right)^k$$

where $N(A)$ denotes the number of outcomes in A for some positive integer k, i.e. $k \in \mathbb{Z}^+$.

For what values of k is this assignment valid?

Example 2.2: Happy Birthmonth!

Consider the events E_1, E_2, and E_3 from Example 1.1 part 2.

- $E_1 = A_1 \bigcap B_1 \bigcap C_1$
- $E_2 = \bigcup_{i=1}^{12}(A_i \bigcap B_i \bigcap C_i)$
- $E_3 = \bigcup_{i=1}^{12}(A_i \bigcap B_i \bigcap C_i')$

Suppose that the probability of any outcome is equally likely.

a) What is the probability of each event?
b) What is the probability that exactly 2 of the students are born in the same month?
c) What is the probability that at least 2 of the students are born in the same month?
d) What does the probability in part c) mean?

Example 2.3

Provide an interpretation for the following statements:

a) The probability that a randomly selected number between 1 and 10 is prime is .5.
b) The probability that we draw a club from a well shuffled deck of cards is .25.
c) The probability that a randomly selected newborn baby is assigned to be male at birth is .503.
d) The probability that it will rain this afternoon is .70.

Exercise 2.1

You and your friend play a game of chance. They think of a number between 1 and 10, and you try to guess it. You win if you guess the number.

Suppose that your friend choose the number at random (i.e., the numbers are equally likely).

a) Compute the probability of winning and provide an interpretation.
b) What is the probability that your guess is exactly one number away from the number your friend chose?
c) What is the probability that your guess is within one number of the number your friend chose?
d) What is the probability that your guess is more than one number away from the number your friend chose?