Homework #1

ST 554

Box of blocks

A box contains 3 blocks (one red, one green, and one blue).

a. Consider an experiment that consists of taking one block from the box, then replacing it in the box, then drawing the second block from the box. What is the sample space? It is important to know the order the blocks are selected.

b. Repeat the above experiment when the second block is drawn *without* replacing the first block.

c. If there is equal probability of choosing every block, what is the probability of getting at least one red block in each of the above two experiments? Why are the probabilities not equal?

Three tosses

Consider the experiment of tossing a fair coin *three* times. Define the events: A to be exactly one head is observed and B to be at least one tail is observed.

a. Write out the sample space. (Use the notation T for tail and H for head.)
b. Write out the outcomes which make up event A.
c. Write out the outcomes which make up event $A \cup B$.
d. Are the events A and B disjoint?

Partition

Let $\{B_j\}_{j=1}^3$ be a partition, and A be a subset, of the sample space S. Show, using a Venn diagram or table, that if you know $(A \cap B_j)$ for $j = 1, 2, 3$, then you can find A.

Blitzstein & Hwang: Chapter 1

3, 8, 22, 23, 29, 42, 47, 56

Extra problems: Chapter 1 (optional)

- solved: 26, 31, 32
- interest: 5, 14, 24, 45, 58

Computer Experiment: Sampling (optional)

Suppose a coin has probability p of falling heads up. If we flip the coin many times, we would expect the proportion of heads to be *near* p. For $p = 0.30$ and $n = 1, 2, \ldots, 1000$, simulate n coin flips and plot the proportion of heads as a function of n. Repeat for $p = 0.03$. Are there differences in how *near* the simulated proportion is to p?