

## Math 342 — Introduction

**Problem 1.** Consider the random experiment where we toss a coin four times. Let  $\Omega$  be the sample space of the experiment, let  $A$  be the event that we get heads on the first two tosses, let  $B$  be the event that we get two heads in the first three tosses, and let  $C$  be the event we get an odd number of heads.

- Find  $|\Omega|$  and list some of the outcomes in  $\Omega$ .
- List the outcomes in each of  $A$ ,  $B$ , and  $C$ .
- Find  $P(A)$ ,  $P(B)$ , and  $P(C)$ .

**Problem 2.** Consider the random experiment of repeatedly rolling a die until you get a 6.

- Using the words *success* and *failure*, give an informal explanation of how the following set  $\Omega$  expresses the outcomes of this experiment:

$$\Omega = \{S, FS, FFS, FFFS, \dots\}.$$

- Which is true:  $|\Omega| < \infty$  or  $|\Omega| = \infty$ ? That is, is  $\Omega$  finite or infinite?
- Let  $A$  be the event that it takes three or fewer rolls to get a 6. List the outcomes in  $A$ .
- Consider the formula  $P(A) = \frac{|A|}{|\Omega|}$ . Do you think it holds in this example? Why or why not?

**Problem 3.** Here is a classical problem, called the Birthday Problem, for you to discuss with your groupmates and friends or family members outside of class. We'll discuss it later in the semester but I put it here as a fun preview. *How many people must be in a room so that the probability that at least two people share a birthday is at least 50%?* No need to write a solution, but tell me what your guess is, as well as the guess of a friend or family member outside of class. By the way, my birthday is August 17; is that yours too?