Math 224 **Fall 2017**
Homework 1 **Drew Armstrong**

Problems from 9th edition of *Probability and Statistical Inference* by Hogg, Tanis and Zimmerman.

- Section 1.1, Exercises 4,5,6,7,9,12.

Additional Problems.

1. Consider a biased coin with $P(\text{“heads”}) = p$ and $P(\text{“tails”}) = 1 - p$. Suppose that you flip the coin n times and let X be the number of heads that you get. Compute $P(X \geq 1)$. [Hint: Observe that $P(X \geq 1) + P(X = 0) = 1$.]

2. Suppose that you roll a pair of fair six-sided dice.

(a) Write down the elements of the sample space S. What is $\#S$? Are the outcomes equally likely?

(b) Compute the probability of getting a “double six.” [Hint: Let $E \subseteq S$ be the subset of outcomes that correspond to getting a “double six.” Compute $P(E) = \#E/\#S$.]

3. The Chevalier de Méré considered the following two games/experiments:

(1) Roll a fair six-sided die 4 times.

(2) Roll a pair of fair six-sided dice 24 times.

For the first experiment, let X be the number of “sixes” that you get. Apply counting and axioms of probability to compute $P(X \geq 1)$. For the second experiment let Y be the number of “double sixes” that you get. Apply similar ideas to compute $P(Y \geq 1)$. Which of these two events is more likely? [Hint: You can think of a fair six-sided die as a bised coin with “heads”=“six” and “tails”=“not six,” so that $P(\text{“heads”}) = 1/6$ and $P(\text{“tails”}) = 5/6$. You will find that it is easier to compute $P(X = 0)$ and $P(Y = 0)$.]