Math 224 **Fall 2017**
Homework 2 **Drew Armstrong**

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

- Section 1.2, Exercises 5, 7, 13, 16.
- Section 1.3, Exercises 4, 6, 7, 11.
- Section 1.5, Exercises 2, 4.

Additional Problems.

1. Pascal's Triangle. We showed in class that the binomial coefficient $\binom{n}{k}$ for $0 \leq k \leq n$ is given by the formula

$$\binom{n}{k} = \frac{n!}{k! \cdot (n-k)!}.$$

When $0 < k < n$, use this formula to prove that

$$\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-1}{k}.$$

2. Pascal's Tetrahedron. Let k_1, k_2, k_3 be non-negative whole numbers that add to n. We saw in class that the *trinomial coefficient* $\binom{n}{k_1,k_2,k_3}$ is given by the formula

$$\binom{n}{k_1, k_2, k_3} = \frac{n!}{k_1! \cdot k_2! \cdot k_3!}.$$

In the case that k_1, k_2, k_3 are strictly positive, use this formula to prove that

$$\binom{n}{k_1, k_2, k_3} = \binom{n-1}{k_1-1, k_2, k_3} + \binom{n-1}{k_1, k_2-1, k_3} + \binom{n-1}{k_1, k_2, k_3-1}.$$