

### Homework 1 Problems - Version 2

**2.3, #9:** Ten job applicants have been invited for interviews, five having been told to come in the morning and five having been told to come in the afternoon. In how many different orders can the interviews be scheduled? Compare your answer to the number of different orders in which the interviews can be scheduled if all 10 applicants were told to come in the morning.

**2.5, #5:** If a campus telephone extension has four digits, how many different extensions are there with no repeated digits:

- (a) If the first digit cannot be 0?
- (b) If the first digit cannot be 0 and the second cannot be 1?

**2.7, #19:** Consider the identity

$$\binom{n}{m} \binom{m}{k} = \binom{n}{k} \binom{n-k}{m-k}.$$

- (a) Prove this identity using an “algebraic” proof.
- (b) Prove this identity using a “combinatorial” proof.

**2.7, #23:** Prove the following identity (using a combinatorial proof if possible). The identity is called *Vandermonde’s identity*.

$$\binom{n+m}{r} = \binom{n}{0} \binom{m}{r} + \binom{n}{1} \binom{m}{r-1} + \binom{n}{2} \binom{m}{r-2} + \cdots + \binom{n}{r} \binom{m}{0}.$$

**2.8, #14:** Suppose that we have 10 different pairs of gloves. From the 20 gloves, 4 are chosen at random. What is the probability of getting at least one pair?

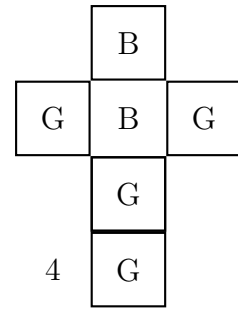
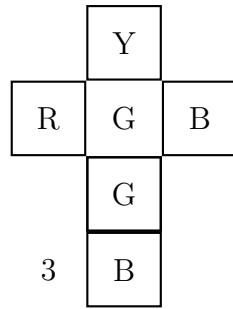
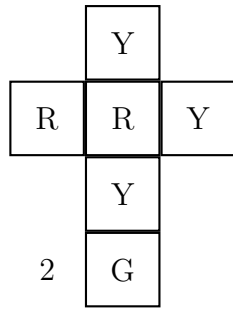
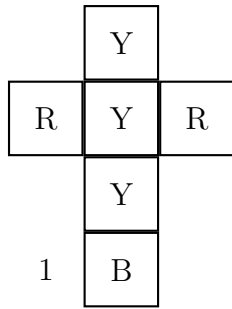
*For the next problem:* When it is unclear whether balls or cells are distinguishable, you should state your interpretation, give a reason for it, and then proceed.

**2.10, #10:** In checking the work of a proofreader, we look for 5 kinds of misprints in a textbook. In how many ways can we find 12 misprints?

**2.11, #8:** How many RNA chains have the same makeup of bases as the chain

UGCCAUCCGAC?

**EXTRA PROBLEM.** Consider another version of Instant Insanity where the blocks are arranged in the following fashion:



Is the problem solvable in this scenario? Why or why not?