Name: \_

**Directions:** Show all work. No credit for answers without work. Unless specifically asked for a numerical answer, you may leave your answers in terms of factorials.

1. [3 points] Evaluate P(7,3) numerically.

2. [3 points] A bag of marbles contains 3 red marbles, 4 blue marbles, 1 yellow marble, and 6 green marbles. One by one, a marble is removed from the bag, its color is recorded on a list, and the marble is discarded; the process repeats until the bag is empty. How many lists of colors are possible?

3. [4 points] How many 4-digit ATM pins start or end with a 5? For example, 5289, 3125, and 5555 count, but 1556 does not.