# HW 4

**Group 1** **Grade:**

Two gamblers bet \$1 each on the successive tosses of a coin. Each has a bank of \$6. What is the probability that

1. they break even after six tosses of the coin?
2. one player—say, Jones—wins all the money on the tenth toss of the coin?

**Group 2** **Grade:**

Alice searches for her term paper in her filing cabinet, which has several drawers. Each drawer would be selected with probability $p_i > 0 (i = 1, 2, \ldots, j-1, j, j+1, \ldots)$, and the term paper is in drawer $j$ but Alice doesn't know which one is. The drawers are so messy that even if she correctly guesses that the term paper is in drawer $j$ (*i.e.* with probability $p_j$), the probability that she finds it is only $d$. Alice searches in a particular drawer, but the search is unsuccessful. Condition on this, what is the probability that she chose the correct drawer? And what is the probability that she chose the wrong one?
**Note:** The calculation of this problem is not difficult, but the statement can be misleading. Try to describe the problem in your own words.
**Note:** You probably have experienced this situation in your life. But you may not notice that a failure search still provides information and increase the chance of success. In designing a strategy to maximize the long term success rate of a sequential experiment, this is a very important concept to start with.

**Group 3** **Grade:**

A hunter has two hunting dogs. One day, on the trail of some animal, the hunter comes to a place where the road diverges into two paths. He knows that each dog, independent of the other, will choose the correct path with probability p. The hunter decides to let each dog choose a path, and if they agree, take that one, and if they disagree, to randomly pick a path. Is his strategy better than just letting one of the two dogs decide on a path?

**Group 4** **Grade:**

You are a member of a class of 18 students. A bowl contains 18 chips: 1 blue and 17 red. Each student is to take one chip from the bowl without replacement. The student who draws the blue chip is gauranteed an 'A' for the course.

1. If you have a choice of drawing first, fifth or last, which would you choose?
2. Suppose the bowl contains 2 blue chips and 16 red chips. What position would you now choose (Not limited to first, fifth or last)?

**Group 5** **Grade:**

A hospital receives 40% of its flu vaccine from Company A and the remainder from Company B. Each shipment contains a large number of vials ov vaccine. From Company A, 3% of the vials are ineffective, from Company B, 2% are ineffective. A hospital tests $n = 25$ randomly selected vials from one shipment and finds that two are ineffective. What is the conditional probability that the shipment came from Company B?