

## In-Class Problems — Week 10, Mon

**Problem 1.** (a) What is the probability that a random poker hand contains cards from at most two suits?

(b) Suppose you repeatedly flip a fair coin (*fair* means that heads and tails are equally likely to appear). What is the probability that you flip exactly 4 heads out of 8? between 3 and 5 heads?

**Problem 2.** Here is a coin-flipping game: flip a fair coin at most four times but stop sooner if two Heads come up in a row.

(a) What is a suitable sample space (set of outcomes) for this game?

(b) What are reasonable probabilities to assign to the sample points?

(c) You win when two Heads in a row have come up. Are the odds of winning this game in your favor?

**Problem 3.** Suppose the game *Let's Make A Deal* is changed slightly. Instead of having 3 doors with 1 grand prize, in the new game there are 4 doors with 2 grand prizes. Otherwise, the rules of the game remain the same:

1. The contestant picks one of the doors.
2. Assistant Carol opens a different door that has a goat behind it.
3. The contestant can then **stick** with his original pick or **switch** to an unopened door. He wins a prize only if his final pick is the door with the prize.

Assume that the prizes are equally likely to be placed behind each of the doors, and that Carol and the contestant are also equally likely to pick each door among their possible choices.

(a) In the new game, what is the probability of winning with the “stick” strategy? How about the “switch” strategy?

(b) In the original Monty Hall game, the probabilities of the winning-with-stick and the winning-with-switch strategies summed to one, but here they don't. How come?