Math 6a: Homework 20
Homework #20 is due March 18.

Dependent probability

When the probability of one event depends on the probability of the previous event, the events are called dependent. To find the probability for the two events to occur, we use the independent probability for the first even and the dependent probability for the second:
P(A ∩ B) = P(A) P(B|A), where P(B|A) is the probability of B given that A has happened.

Monty Hall Problem

Suppose you are on a game show, and you are given the choice of three doors. Behind one door is a car; behind the others: goats. You pick a door, say door number 1. The host, who knows what is behind each door opens another door, door number 3; revealing a goat. He then says to you: "Do you want to pick door number 2?"The answer is yes!
Let us see what happens if you have chosen door number1:

Car is behind:	Probability	It is better to switch?
Door 1	1/3	No, stay
Door 2	1/3	Yes, switch
Door 3	1/3	Yes, switch

Thus, switching wins with a probability of 2/3. Here is one more problem of a similar type:
Exchange Paradox
You are given two indistinguishable envelopes, each of which contains some money. It is known that one envelope contains ten times as much as the other. You pick one envelope at random, it is opened and you see that it contains $50. Now you are given a choice: keep this money, or exchange it for the other envelope. What should you do?

Homework

1. You have a bag with 6 red, 3 green, and 4 blue marbles. You take a marble out of the bag and you do not return it. Find the probability for:
   a. The first marble to be red and the second to be blue
   b. To pick 3 red marbles in a row
   c. To pick one blue and the second not green.

2. In a bag of 20 coins 5 are unfair and the rest are fair coins in a sense that they have an equal probability for head or tail when flipped. If the probability for a tail for the unfair coin is 0.8, what is the probability to pick a coin and get three heads in a row?

3. **Math Kangaroo practice** (Do not submit!)
   https://kangaroo.math.ca/samples/2017/2017gr0506e.pdf
   https://kangaroo.math.ca/samples/2017/2017gr0708e.pdf