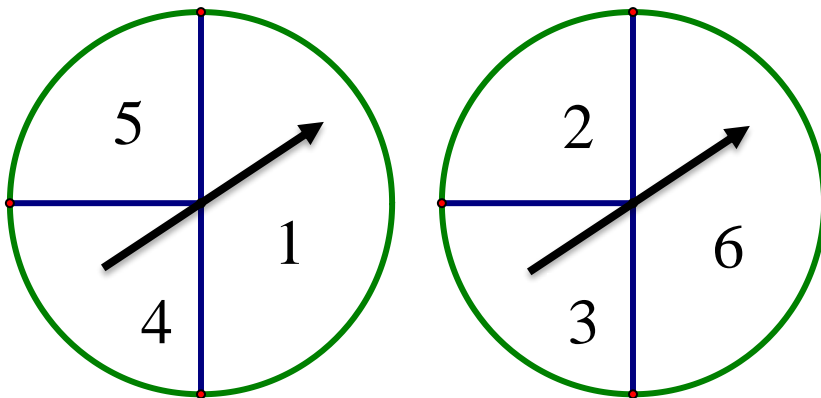


1. Consider an experiment that consists of withdrawing a ball from the box, replacing it, and withdrawing a second ball. Draw a tree diagram. Be sure to include labels and probabilities. Use the tree diagram to make a table with outcomes and probabilities. **Express all probabilities as fractions in lowest terms.** There are 2 red, 2 blue and 1 green ball in the box.
 - a. What is the sample space of this experiment?
 - b. As a set, what is the event A: the first ball drawn is red? What is its probability?
 - c. As a set, what is the event B: the same color ball is drawn twice? What is its probability?
 - d. Are events A and B independent? If not, are they positively or negatively reinforcing?

2. 100 people were present at a protest against cuts in education spending by the federal government. 40 brought placards denouncing Trump, 50 brought placards denouncing congress, and 20 did not have placards. If one of them was randomly chosen, find the probability that he or she brought
 - a. A placard denouncing Trump or congress
 - b. A placard denouncing Trump and congress
 - c. Are the events students brings a placard denouncing Trump and brings a placard denouncing congress independent? If not, are they positively or negatively reinforcing?

3. 2 fair 6-sided die are rolled (one green & one red) & the outcome is coordinate (green face, red face).
 - a. Let A be the event that the faces sum to an even number greater than 8. Find A as a set and $P(A)$.
 - b. Let B be the event that the faces are the same (doubles). Find $P(B)$.
 - c. Find $A \cap B$ as set. Find $P(A \cap B)$.
 - d. Are A and B independent events? If not, are they positively or negatively reinforcing?

4. In a game, each spinner is spun once and the results are added.



Suppose that the outcome is 7. What is the chance that the first spinner was 1?

5. Four cards are pulled from a deck of 52 cards. Find the probability of obtaining
 - a. at least one club.
 - b. a pair.
 - c. 3 of a kind.
 - d. 2 pair
 - e. straight (4 cards whose face values are in order, an ace can be lower than 2 or higher than king.)
 - f. a flush (all 4 of the same suit)
 - g. a straight flush
 - h. use your answers to e, f and g to determine whether getting a straight and getting a flush are independent events. If not, are they positively or negatively reinforcing?
6. A jar contains 3 chocolate chip cookies and x oatmeal cookies. Two cookies are pulled one at a time from the jar without replacement.
 - a. Find an expression that represents the probability the first cookie is chocolate chip and the second cookie is oatmeal.
 - b. Find an expression that represents the probability one cookie is chocolate chip and the other cookie is oatmeal, regardless of the order in which they come out.
 - c. If the chance of getting the event described in a. is $2/7$, find an equation and solve to determine x .
7. A 5 digit PIN number can begin with any digit (except zero) and the remaining digits have no restriction.
 - a. Find the probability that the PIN code has no repeated digits, begins with a 7 and ends with an 8.
 - b. Find the probability of the PIN code is odd.
 - c. Find the conditional probability that the PIN code is odd given that the code has no repeated digits.
 - d. Are the events PIN is odd and PIN has no repeated digits independent? If not, are they positively or negatively reinforcing?
8. There are 12 top female runners in a marathon, 7 from Kenya and 5 from outside of Kenya. If they each have an equal chance getting any of the top 12 positions, find the chance that
 - a. exactly 3 of the top 5 runners will be from Kenya
 - b. all 5 of the top runners will be from Kenya
 - c. at least 3 of the top 5 runners will be from Kenya.