

1. A bag contains 6 marbles of which 3 are red, 2 are green and 1 is blue. Consider the experiment of drawing 1 marble from the bag (without looking), returning the marble to bag, and then drawing 1 marble again. (Here we say the marbles are drawn *with replacement*).
 - (a) Write the sample space for this experiment as described.
 - (b) Suppose that the first marble is not returned to the bag. Write the sample space in this case. (Here we say the marbles are drawn *without replacement*).
 - (c) What is the probability that both marbles drawn are red when they are drawn with replacement? Assume that all outcomes are equally likely.
 - (d) What is the probability that both marbles drawn are red when they are drawn without replacement? Assume that all outcomes are equally likely.
2. Alex, Blake and Charley take turns flipping a coin (starting with Alex, then Blake, then Charley). The first person to get heads wins. Let $A/B/C$ be the events that Alex/Blake/Charley wins respectively.
 - (a) Describe the sample space S for this experiment.
 - (b) Write the subset A of S .
 - (c) Write the subset B of S .
 - (d) Write the subset $A \cap B$.
 - (e) Write the subset $A \cup C$
 - (f) Write the subset $(A \cup B)'$ (the complement of $A \cup B$).
3. A certain campus restaurant only accepts payment by debit or credit. It is known that 34 percent of the students on campus carry a credit card, 85 percent of the students on campus carry a debit card and 27 percent carry both.
 - (a) Draw a Venn diagram representing this situation.
 - (b) What percentage of the students on campus will be able to make a purchase at this particular restaurant?
4. Suppose a sample of Canadians are surveyed, and it is found that 22 percent speak French, 15 percent speak Spanish and 8 percent speak both French and Spanish.
 - (a) What percentage speaks neither French nor Spanish?
 - (b) What percentage speaks French but not Spanish?
5. A pair of 6-sided dice are thrown. What is the probability that the second die is larger than the first?
6. A magazine publishes an article on a study done with 1000 people. The study shows that of these 1000 people:
 - 470 are married,
 - 525 have university degrees,
 - 312 have professional certifications,
 - 42 have university degrees and professional certifications,
 - 147 are married and have university degrees,
 - 86 are married and have professional certifications, and
 - 25 are married, have a university degree, and a professional certifications.

Give a reason why we should be skeptical of this study. Hint: Show that these numbers violate the rules of probability.