1. (a) If you roll a die 10 times, what is the probability that at least one of the rolls is a six?

    (b) A pizzeria offers 6 toppings. How many kinds of 3-topping pizzas are possible if repeated toppings are not allowed? (State any assumptions you make.)

    (c) Roll a red 6-sided die and a blue 6-sided die. What is the probability that at least one of them is a 1?

    (d) In 2008, about 38% of Knox County voters voted for Obama, 61% for McCain, and 1% for other. What is the probability that two randomly selected Knox County voters would have voted for McCain?

2. Among ten volunteers for a mission, six are Klingon and four are Vulcan. Suppose four volunteers are chosen at random.

   (a) Find the probability function of X, the number of Klingons chosen.

   (b) What is the probability that the number of Klingons chosen is more than the number of Vulcans chosen?

   (c) What is the probability that the chosen volunteers are all Klingon or all Vulcan?

3. A certain disease is present in 3% of the population. A test for the disease is given to a group of 50 people.

   (a) Let X be the number of people found to have the disease. What kind of random variable is X, with what parameters?

   (b) What is the probability that at least one of the people has the disease?

   (c) The disease can be treated at a cost of $ 12 per person. Find the expectation and variance of the cost to treat the disease for this group of 50 people.
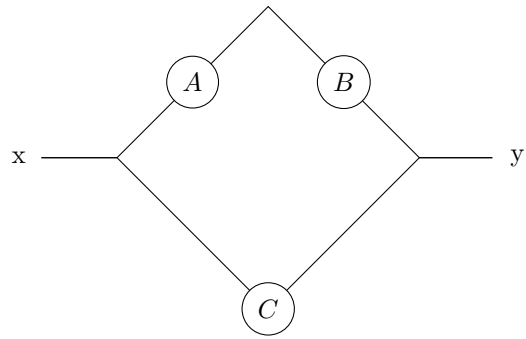
4. In the diagram above, each of the switches is independent. Switch A is closed with probability 0.9, switch B is closed with probability 0.8, and switch C is closed with probability 0.7.

   (a) What is the probability that current flows from x to y?

   (b) Given that current does flow from x to y, what is the probability that switch A is closed?