1. Two dice are thrown together. Let A be the event 'getting 6 on the first die' and B be the event 'getting 2 on the second die'. Are the events A and B independent?

2. Pedro observed what customers ordered at his ice cream shop and found the following probabilities:

   P(vanilla)=0.3

   P(sundae)=0.2

   P (vanilla and sundae) =0.15

3. You toss a fair coin three times:
   What is the probability of three heads, HHH?

   What is the probability that you observe exactly one heads?

   Given that you have observed at least one heads, what is the probability that you observe at least two heads? Find the probability that a customer ordered vanilla ice cream given they ordered a sundae.

4. In my town, it's rainy one third of the days. Given that it is rainy, there will be heavy traffic with probability ½ and given that it is not rainy, there will be heavy traffic with probability ¼. If it's rainy and there is heavy traffic, I arrive late for work with probability ½. On the other hand, the probability of being late is reduced to $\frac{1}{8}$ if it is not rainy and there is no heavy traffic. In other situations (rainy and no traffic, not rainy and traffic) the probability of being late is 0.25. You pick a random day.
   a. What is the probability that it's not raining and there is heavy traffic and I am not late?
   b. What is the probability that I am late?
   c. Given that I arrived late at work, what is the probability that it rained that day?

5. Suppose the llama flu disease has become increasingly common, and now 0.1% of the population has it (1 in 1000 people). Suppose there is a test for it which is 98% accurate (e.g., 2% of the time it will give the wrong answer). Given that you tested positive, what is the probability you have the disease? Before any computation, think about what you think the answer might be.

6. The prevalence of a certain type of cancer among women aged 50–60 is 1 in 150. A blood test will be positive 98% of the time if the cancer is present, but is also positive 7% of the time if the cancer is not present. 1 In a routine check-up, a 55-year-old woman receives a positive blood test.
   a. What is the probability that she has this type of cancer?
   b. How would you interpret this calculation if the test were ordered because of the presence of other symptoms associated with the disease?