Practice questions

1. Alice tosses two fair coins. Given that at least one is a head, what is the probability that both are heads?

2. Alice draws two cards at random from a deck of 52. Given that the first card is from a black suit, what is the probability that the second card is a spade (♠)?

3. Alice tosses a six-sided die, then she tosses R fair coins, where R is roll of the die. Given that all the coin tosses came out tails, find the probabilities of each outcome for the die.

4. There are 6 red balls and 1 blue ball. Each ball is randomly placed in one of two bins.

   (a) What is the probability that the bin with the larger number of balls contains k balls $(k \in \{4, 5, 6, 7\})$?

   (b) What is the probability that the bin with the larger number of balls contains the blue ball? (*Hint:* Use Bayes' rule.)

5. Jar A contains 10 black balls and jar B contains 10 white balls. At each step, a ball is picked at random from each jar and moved to the other jar (so the number of balls in each jar stays the same). What is the probability that after four steps the initial configuration is recovered? (*Textbook problem 1.23*)