

EXERCISES

3.2

A

1. In a trial, the judge is 65% sure that Susan has committed a crime. Robert is a witness who knows whether Susan is innocent or guilty. However, Robert is Susan's friend and will lie with probability 0.25 if Susan is guilty. He will tell the truth if she is innocent. What is the probability that Robert will commit perjury?
2. There are 14 marketing firms hiring new graduates. Kate randomly found the recruitment ads of six of these firms and sent them her resume. If three of these marketing firms are in Maryland, what is the probability that Kate did not apply to a marketing firm in Maryland?
3. In a game of cards, two cards of the same color and denomination form a pair. For example, 8 of hearts and 8 of diamonds is one pair, king of spades and king of clubs is another. If six cards are selected at random and without replacement, what is the probability that there will be no pairs?
4. If eight defective and 12 nondefective items are inspected one by one, at random and without replacement, what is the probability that (a) the first four items inspected are defective; (b) from the first three items at least two are defective?
5. There are five boys and six girls in a class. For an oral exam, their teacher calls them one by one and randomly. (a) What is the probability that the boys and the girls alternate? (b) What is the probability that the boys are called first? Compare the answers to parts (a) and (b).
6. An urn contains five white and three red chips. Each time we draw a chip, we look at its color. If it is red, we replace it along with two new red chips, and if it is white, we replace it along with three new white chips. What is the probability that, in successive drawing of chips, the colors of the first four chips alternate?
7. Solve the following problem, asked of Marilyn Vos Savant in the "Ask Marilyn" column of *Parade Magazine*, January 3, 1999.

You're at a party with 199 other guests when robbers break in and announce that they are going to rob one of you. They put 199 blank pieces of paper in a hat, plus one marked "you lose." Each guest must draw, and the person who draws "you lose" will get robbed. The robbers offer you the option of drawing first, last, or at any time in between. When would you take your turn?

Assume that those who draw earlier will not announce whether they drew the "you lose" paper.

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8. Suppose that 75% of all people with credit records improve their credit ratings within three years. Suppose that 18% of the population at large have poor credit records, and of those only 30% will improve their credit ratings within three years. What percentage of the people who will improve their credit records within the next three years are the ones who currently have good credit ratings?
- B**
9. Cards are drawn at random from an ordinary deck of 52, one by one and without replacement. What is the probability that no heart is drawn before the ace of spades is drawn?
 10. From an ordinary deck of 52 cards, cards are drawn one by one, at random and without replacement. What is the probability that the fourth heart is drawn on the tenth draw?
Hint: Let F denote the event that in the first nine draws there are exactly three hearts, and E be the event that the tenth draw is a heart. Use $P(FE) = P(F)P(E|F)$.
 11. In a series of games, the winning number of the n th game, $n = 1, 2, 3, \dots$, is a number selected at random from the set of integers $\{1, 2, \dots, n+2\}$. Don bets on 1 in each game and says that he will quit as soon as he wins. What is the probability that he has to play indefinitely?
Hint: Let A_n be the event that Don loses the first n games. To calculate the desired probability, $P(\bigcap_{i=1}^{\infty} A_i)$, use Theorem 1.8.