

Section 2.4 Complements, Unions, and Intersections

1. Roll two 6-sided dice. Let

- (a) E_1 be the event in which both dice show an even number;
- (b) E_2 be the event in which the sum of the numbers showing is 6; and
- (c) E_3 be the event in which the sum of the numbers showing is less than 11.

Find $P(E_1)$, $P(\overline{E_1})$, $P(E_2)$, $P(\overline{E_2})$, $P(E_3)$, and $P(\overline{E_3})$.

2. One card is drawn from a standard 52-card deck. Find the probability of selecting at least a 10 (10,J,Q,K,A) or a heart.

3. A new medication being tested produces headaches in 5% of its users, upset stomach in 15%, and both side effects in 2%.

- (a) Find the probability that at least one of these side effects is produced.
- (b) Find the probability that neither of these side effects is produced.

4. An 8-sided die is constructed that has two faces marked with 2s, two faces marked with 3s, two faces marked with 5s, and two faces marked with 8s. If this die is rolled a single time, find the probability of

- (a) Getting a 2.
- (b) Not getting a 2.
- (c) Getting a 2 or a 3.
- (d) Getting neither a 2 nor a 3.
- (e) Getting an even number.
- (f) Not getting an even number.

5. If $P(A) = 0.6$, $P(B) = 0.4$, and $P(A \cap B) = 0.3$, find $P(A \cup B)$.

6. If $P(A \cup B) = 0.8$, $P(A) = 0.6$, and $P(B) = 0.4$, find $P(A \cap B)$.

7. Suppose A , B , and C are three events such that

$P(A) = .55$, $P(B) = .4$, $P(C) = .45$, $P(A \cap B) = .3$, $P(A \cap C) = .2$, $P(B \cap C) = 0.15$, and $P(A \cap B \cap C) = 0.1$. Draw a Venn diagram with 3 intersecting circles representing this scenario, then answer the following questions.

- (a) What is the probability that event A or event B occurs?
- (b) What is the probability that event B or event C occurs?
- (c) What is the probability that exactly one event occurs?
- (d) What is the probability that at least one of these events occurs?
- (e) What is the probability that none of these events occurs?

8. A survey of business executives finds that 40% read *Business Week*, 50% read *Fortune*, 40% read *Money*, 17% read both *Business Week* and *Fortune*, 15% read both *Business Week* and *Money*, 14% read both *Fortune* and *Money*, and 8% read all three of these magazines. Hint: Draw a Venn diagram with 3 intersecting circles!

- (a) What is the probability that one of these executives reads *Business Week* or *Money*?
- (b) What is the probability that one of these executives reads *Fortune* or *Money*?
- (c) What is the probability that one of these executives reads exactly one of these three magazines?
- (d) What is the probability that one of these executives reads at least one of these three magazines?
- (e) What is the probability that one of these executives reads none of these magazines?