1) Suppose there are 10 teams in a soccer league.
   a) How many total ways can all 10 teams place at the end of the season?
   b) How many ways can the top 4 teams finish?
   c) To qualify for the next round of the tournament, a team needs to finish in the top 6. How many ways can the qualifiers be made?

2) 60% of students in a class are sophomores and 40% are juniors. Sophomores are 3 times as likely to be math ed majors as juniors. Find P(Soph | Math Ed)

3) Suppose you roll an 8-sided die. Let E = even # and B = {1, 2, 3}. Check if E is independent of B.

4) Draw Venn Diagrams to verify $A \cup \sim B = A \cup (\sim A \cap \sim B)$.

5) In our class, 20% are math majors, 33% are actuary majors, and 47% are econ majors.
   • 85% of math majors will pass the exam
   • 73% of actuary majors will pass the exam
   • 64% of econ majors will pass the exam

   a) What is the probability a student will not pass the exam?
   b) What is the probability a student is an actuary if we know they passed the exam?
   c) What is the probability a student is a math or econ major given they passed the exam?

1.1-5. Consider the trial on which a 3 is first observed in successive rolls of a six-sided die. Let A be the event that 3 is observed on the first trial. Let B be the event that at least two trials are required to observe a 3. Assuming that each side has probability 1/6, find **(a)** $P(A)$, **(b)** $P(B)$, and **(c)** $P(A \cup B)$.

1.1-6. If $P(A) = 0.4$, $P(B) = 0.5$, and $P(A \cap B) = 0.3$, find **(a)** $P(A \cup B)$, **(b)** $P(A \cap B')$, and **(c)** $P(A' \cup B')$.

1.1-7. Given that $P(A \cup B) = 0.76$ and $P(A \cup B') = 0.87$, find $P(A)$.

1.1-8. During a visit to a primary care physician's office, the probability of having neither lab work nor referral to a specialist is 0.21. Of those coming to that office, the probability of having lab work is 0.41 and the probability of having a referral is 0.53. What is the probability of having both lab work and a referral?

1.2-11. Three students (S) and six faculty members (F) are on a panel discussing a new college policy.
   (a) In how many different ways can the nine participants be lined up at a table in the front of the auditorium?
   (b) How many lineups are possible, considering only the labels S and F?
   (c) For each of the nine participants, you are to decide whether the participant did a good job or a poor job stating his or her opinion of the new policy; that is, give each of the nine participants a grade of G or P. How many different "scorecards" are possible?

1.3-7. An urn contains four colored balls: two orange and two blue. Two balls are selected at random without replacement, and you are told that at least one of them is orange. What is the probability that the other ball is also orange?

1.2-13. A bridge hand is found by taking 13 cards at random and without replacement from a deck of 52 playing cards. Find the probability of drawing each of the following hands.

(a) One in which there are 5 spades, 4 hearts, 3 diamonds, and 1 club.

(b) One in which there are 5 spades, 4 hearts, 2 diamonds, and 2 clubs.

1.3-4. Two cards are drawn successively and without replacement from an ordinary deck of playing cards. Compute the probability of drawing

(a) Two hearts.

(b) A heart on the first draw and a club on the second draw.

(c) A heart on the first draw and an ace on the second draw.

HINT: In part (c), note that a heart can be drawn by getting the ace of hearts or one of the other 12 hearts.

1.3-12. You are a member of a class of 18 students. A bowl contains 18 chips: 1 blue and 17 red. Each student is to take 1 chip from the bowl without replacement. The student who draws the blue chip is guaranteed an A for the course.

(a) If you have a choice of drawing first, fifth, or last, which position would you choose? Justify your choice on the basis of probability.

1.3-14. Paper is often tested for "burst strength" and "tear strength." Say we classify these strengths as low, middle, and high. Then, after examining 100 pieces of paper, we find the following:

Tear Strength	Burst Strength		
	A_1 (low)	A_2 (middle)	A_3 (high)
B_1 (low)	7	11	13
B_2 (middle)	11	21	9
B_3 (high)	12	9	7

If we select one of the pieces at random, what are the probabilities that it has the following characteristics:
(a) A_1?
(b) $A_3 \cap B_2$?
(c) $A_2 \cup B_3$?

(d) A_1, given that it is B_2?
(e) B_1, given that it is A_3?

1.4-1. Let A and B be independent events with $P(A) = 0.7$ and $P(B) = 0.2$. Compute **(a)** $P(A \cap B)$, **(b)** $P(A \cup B)$, and **(c)** $P(A' \cup B')$.

1.4-2. Let $P(A) = 0.3$ and $P(B) = 0.6$.
(a) Find $P(A \cup B)$ when A and B are independent.
(b) Find $P(A \mid B)$ when A and B are mutually exclusive.

1.5-5. At a hospital's emergency room, patients are classified and 20% of them are critical, 30% are serious, and 50% are stable. Of the critical ones, 30% die; of the serious, 10% die; and of the stable, 1% die. Given that a patient dies, what is the conditional probability that the patient was classified as critical?

select **Answers** (rounded to 3 decimals)

2) 0.818
3) Not ind
5) a) 0.288
   b) 0.338
   c) 0.662

1.1-5) b) 5/6
1.1-6) c) 0.7
1.1-7) 0.63
1.1-8) 0.15

1.2-13) a) 0.005
1.3-4) 0.019
1.3-7) 0.2
1.3-12) all the same prob
1.3-14) c) 0.6
      d) 0.268
1.4-1) c) 0.86
1.4-2) 1) 0.72

1.5-5) 0.632