Section 1.5

1. Let $S = \{a, b, c, d, e, f\}$ be a sample space with $P(a) = 0.14$, $P(b) = 0.22$, $P(c) = 0.24$, and $P(e) = 0.18$.

(a) Assuming $d$ and $f$ are equally likely, what are their probabilities?
(b) Let $E = \{a, b, d\}$. What is $P(E^c)$?

2. Given $P(E) = 0.4$, $P(F) = 0.25$, and $P(E \cup F) = 0.55$:

(a) What is $P(E \cap F^c)$?
(b) What is $P(E \cap F)$?

3. A new drug was tested on 1,000 subjects (no animals or humans were harmed in the making of this question). 60 people reported their only side effect was a loss of appetite, 90 people reported their only side effect was a loss of sleep, and 800 people reported no side effects.

(a) What is the empirical probability that a user will have both loss of appetite and loss of sleep?
(b) What are the odds in favor of a user having no side effects?

Section 1.6-1.7

1. Given the tree diagram below, calculate the following probabilities:

(a) $P(B \cap D)$
(b) $P(D)$
(c) Are events $B$ and $D$ independent?
(d) $P(E|C)$
(e) $P(C|E)$

2. A fair 6-sided die is tossed twice.

(a) What is the probability the sum is at least ten given the first toss was a 5?
(b) What is the probability the second toss is a 5 given the first toss was a 5?

3. A basket contains a $10 bill, a $5 bill, and eight $1 bills. A player draws one bill at a time (keeping it each time) until a $1 bill is drawn.

(a) What is the probability the player wins $16?
(b) What is the probability the game ends after exactly two draws?

4. In addition to the basket in the previous problem, a second basket contains a $20 bill, a $10 bill, a $5 bill, and seven $1 bills. A bill is drawn from the second basket and placed in the first basket. Then a bill is drawn from the first basket. If the second bill is $5, what is the probability that the first bill was also $5?
3 Exam I Review

1. Let $p$ be the statement “$2^3 < 3^2$” and $q$ be the statement “$3^4 < 4^3$.”
   (a) Write $p \land \sim q$ in words and determine whether it is true or false.
   (b) Give a symbolic expression for “$2^3 \geq 3^2$ or $3^4 \geq 4^3$” and determine whether it is true or false.

2. Construct a truth table for $((\sim p \lor q) \land (\sim q \lor p)) \lor (p \lor q)$. Is the statement a tautology, a contradiction, or neither?

3. Let $U = \{1, 2, 3, 4, 5, 6\}$, and let $A = \{1, 2, 3, 4\}$, $B = \{2, 3, 4, 5\}$, and $C = \{5, 6\}$. List the elements in each of the following:
   (a) $A \cup B$
   (b) $(A \cap B) \cup C$
   (c) $A \cap B^c \cap C$

4. On a Venn Diagram, shade the region corresponding to $(A \cup B)^c \cap C$.

5. An investment survey of 100 people found that
   - 2 invested in stocks, bonds, and a money market account
   - 30 did not invest in stocks or bonds
   - 16 only invested in a money market account
   - 24 invested in stocks and a money market account
   - 32 used two or more of these investments
   - 59 invested in stocks but not bonds
   - 63 invested in stocks

   (a) How many invested in bonds?
   (b) How many invested in exactly one of the three?

6. Using the game in #3 of the previous section, the total amount of money kept is recorded. What is the sample space for this experiment? Write the probability distribution.