1. Express the shaded region in set notation:

2. A class of math students can be grouped in the following sets:

   \[ A = \{ x | x \text{ is a woman} \} \quad B = \{ x | x \text{ has taken Economics} \} \]

Find the set of women who have not taken Economics in set builder notation

3. A store has sold 100 microwaves. 80 of the microwaves have turntables and 40 of them have programs. If 90 of them have programs or turntables, how many have only turntables?

4. A pizza place has 12 different toppings available for pizza. How many different 2 item pizzas are possible?

5. How many different “words” can be made from the letters \textit{HALLOWEEN}? You must use all the letters, but the “word” does not need to make sense.

6. You are dealt 2 cards. How many ways can you be dealt a blackjack? (that is, a sum of 21 where an ace is worth 1 and a 10 and face cards are worth 10).

7. From a class of 18 students a committee of 5 is chosen. One person on the committee is the chair and the others are the members. How many different committees can be chosen?

8. You have 4 different yellow books and 4 different green books. How many ways can the books be arranged on the shelf if the colors must alternate?

9. You have a bag of jelly beans. There are 4 blue, 3 orange and 2 pink jelly beans. A sample of 3 is chosen. How many ways to have at least one orange in the sample?

10. You do the following experiment: Choose a card and note the suit. Then flip a coin and note the face showing. How many outcomes in the sample space for this experiment?

11. You have a bowl with gold, silver and copper coins. You choose one from the bowl. How many events are possible?

12. The BeeStar company makes deluxe toy wagons out of wood and steel. A wagon cannot contain more than 20 units of steel and must use no more than 10 units of wood and must cost at least $5 to make. If each unit of steel costs $0.50 and weighs 1 pound and each unit of wood costs $1 and weighs 2 pounds, how much steel and wood should be used to make a wagon if the weight is to be minimized? Be sure to show ALL your work. An answer with no work shown is worth nothing.

13. A survey of 200 students is done at a school cafeteria. Use the information given to fill in a Venn diagram:

   - 55 students like pizza and burritos.
   - 130 students did not like chicken.
   - 30 students like all three items.
   - 35 students like burritos but did not like chicken.
   - 55 students like only pizza.
   - 60 students like exactly 2 of these dishes.
   - 15 students like chicken and pizza but not burritos.

Express “liked exactly two of these dishes” in set notation.
14. How many ways can a hand of 4 cards be dealt if 3 of them are queens?

15. There are three letters in an airport’s abbreviation. How many different airport call letters are possible?

16. Among 25 motors 4 are defective. How many ways can a sample of 5 be chosen that contains at least 3 that are defective?

17. How many ways can 5 different blue books and 5 different red books be arranged if red and blue books alternate?

18. Shade the region corresponding to
   (a) $\{x \in U | x \in A^c \text{ or } x \in B\}$
   (b) $(A \cap B)^c$

19. Three possible options on a new car are an alarm (A), a CD player (C) and leather seats (L). Sixty-four cars on a dealer’s lot were examined and the following results were found:
   45 had an alarm
   32 had two options
   8 had all three options
   22 had an alarm and a CD player
   3 had only a CD player
   10 had an alarm and leather seats but not a CD player
   37 did not have leather seats

   (a) Fill in a Venn diagram with the appropriate numbers.

   (b) Shade the region corresponding to not having an alarm.

   (c) Express the following using set notation: “cars that have only a leather seats”

20. Let $E$ and $F$ be two events that are mutually exclusive. Suppose that $P(E) = .2$ and $P(F) = .4$. Find $P(E^c \cap F^c)$.

21. Two standard six sided dice are rolled and the uppermost numbers noted. What is the probability that one of the die shows a 6 or the sum of the uppermost numbers is 9?

22. A package of 12 jumbo eggs has 2 eggs with double yolks. A sample of 2 is chosen for breakfast. What is the probability of at least one double yolk egg in the sample?

23. We had a box with 120 fun size bags of Oodles candy. Each of the bags was opened and the number of pieces in fun size bag of Oodles candy was counted. The following data was found:

<table>
<thead>
<tr>
<th>number of pieces of candy in a bag</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>number of bags</td>
<td>5</td>
<td>30</td>
<td>25</td>
<td>18</td>
<td>15</td>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>

24. What is the probability there are more than 14 pieces of candy in a snack size bag?

25. What is the probability of getting dealt a blackjack from a well shuffled standard deck of 52 cards? A blackjack is a hand of two cards, one card is an ace and one card is a 10, J, Q or K.

26. A student studying for a vocabulary quiz knows 14 of the words from a list of 20. If the test contains 12 words from the study list, what is the probability that the student knows exactly 10 of the words on the quiz?