Test 2 Review Questions

1. Use an alternative method to express each set.
   a. \{2, 4, 6, 8, \ldots, 18\}
   b. \{Alabama, Alaska, Arizona, \ldots, Wisconsin, Wyoming\}
   c. \{x | x is a letter in the word *stupendous*\}
   d. \{y : y is a person in our math class and also a former president of the United States\}

2. Explain why \emptyset \neq \{\emptyset\}.

3. Make up “bag diagram” to illustrate the set \{3, \emptyset, \{\{1, 2\}, \{1, 2, 3\}\}\}.

4. Find the cardinal number of each of these sets.
   a. \{3, 6, 9, \ldots, 18, 21\}
   b. \emptyset
   c. \{x : x is one of the states in the United States\}

5. Decide whether each pair of sets is equal. Justify your answer.
   a. \{1, 3, 5, 7, 9\} and \{9, 7, 5, 3, 1\}
   b. \{2, 3, 4, 5, 6, 7, 8, 9, 10, 9, 11, 12\} and \{2, 3, 4, \ldots, 12\}
   c. \{2, 4, 6, 8, \ldots\} and \{2, 4, 6, \ldots, 1000\}

6. Decide whether each statement is true or false. Justify your answer.
   a. \{daffodil, daisy, rose, carnation\} \subseteq \{f : f is a flower\}
   b. \{daffodil, daisy, rose, carnation\} \subseteq \{f : f is a flower\}
   c. \{x : x is a letter in the word *plenty*\} \subseteq \{x : x is a letter in the word *plentiful*\}
   d. \emptyset \subseteq \{1, 2, 3\}
   e. \emptyset \subseteq \emptyset

7. Which pairs of sets are equivalent?
   a. \{baseball, football, basketball, field hockey, volleyball\} and \{b, f, b, f, v\}
   b. \{1, 3, 5, 7, 9, \ldots, 99\} and \{2, 4, 6, 8, 10, \ldots, 100\}
   c. \{x : x is a letter in the word *tulips*\} and \{x : x is a letter in the word *flower*\}
   d. \{\emptyset\} and \{0\}

8. a. List all of the subsets of the set \{a, b, c\}
    b. How many subsets does the set \{3, 5, 8, 9, 12, 15, 17\}?

9. Let \(U = \{1, 2, 3, \ldots, 10\}\) and let \(A = \{2, 5, 7, 8, 9\}\), \(B = \{3, 4, 5, 7, 9, 10\}\), and \(C = \{5, 3, 8, 9, 2\}\). Find the following sets:
   a. \(A \cap B\)
   b. \(B \cup C\)
   c. \(C'\)
   d. \(A - C\)
10. Using the same sets as in Exercise 9, find the following sets:
   a. \((A \cup B)\) ‘
   b. \((A - C) \cup (A - B)\)
   c. \(A' \cap (B' \cup C)\)

11. Represent each set using a Venn diagram.
   a. \(A \cup B\)
   b. \(B \cap C\)
   c. \(A' \cap B \cap C\)
   d. \((B \cup C) - A\)

12. Use DeMorgan’s laws to represent \((A \cup B)\) ‘ in a different way.

13. Use the following information to answer the given questions.

\[
\begin{align*}
n(A \cap B) &= 4; n(A \cap B \cap C) = 1; n(B \cap C) = 8; n(B - A) = 9; n(B \cup C) = 23; \\
n(A \cap C) &= 6; n(A \cup B \cup C) = 35; n(B') = 32
\end{align*}
\]

   a. How many elements are there in \(C - B\)?
   b. How many elements are there in \(A'\)?

14. A survey was taken of college freshmen regarding the factors that they consider important in choosing a college.
   a. 82 said cost.
   b. 15 said cost but not academics.
   c. 70 said social life.
   d. 48 said all three.
   e. 56 said cost and social life.
   f. 25 said academics but not social life.
   g. 16 said academics but not cost.

   How many said academics in the survey? How many said both academics and social life?
1. a. \( \{x : x \text{ is an even natural number between 1 and 19}\} \)
   b. \( \{x : x \text{ is one of the 50 states that make up the U. S.}\} \)
   c. \( \{s, t, u, p, e, n, d, o\} \)
2. The set on the left is the set that contains no elements. The set on the right contains a single element that is a set.

3. 

4. a. 7
   b. 0
   c. 50
5. a. Yes. The order of elements does not matter
   b. Yes. Duplication of elements does not matter.
   c. No. The first set has elements such as 1002 that are not present in the second set.
6. a. True, since every element in the first set is a flower and thus would be part of the second set and there are additional elements in the second set such as petunia.
   b. True, since every element in the first set is a flower and thus would be part of the second set.
   c. True. The empty set is a subset of every set.
   d. False. The empty set is a subset of every set.
7. a. not equivalent
   b. equivalent
   c. equivalent
   d. equivalent
8. a. \( \emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\} \)
   b. \( 2^7 = 128 \)
9. a. \( \{5, 7, 9\} \)
   b. \( \{2, 3, 4, 5, 7, 8, 9, 10\} \)
   c. \( \{1, 4, 6, 7, 10\} \)
   d. \( \{7\} \)
10. a. \( \{1, 6\} \)
    b. \( \{2, 3, 7, 8\} \)
    c. \( \{1, 3, 6\} \)
11. a. 

b. 

c. 

d. 

12. $A' \cap B'$

13. a. 5
   b. 24

14. 83 said academics and 58 said both academics and social life