1. **Section L1**

1. Determine which of the following are statements:
   (a) Happy New Year!
   (b) Texas A&M won the Music City Bowl in 2015.
   (c) Barack Obama is our current US President.
   (d) When does \(x^2 + 4 = 0\)?
   (e) Kanye West would be the greatest US President ever.

2. Let \(p\) be the statement “\(2^2 = 4\)” and \(q\) be the statement “\(5^2 = 10\).” Write the following in words:
   (a) \(\sim p\)
   (b) \(p \land q\)
   (c) \(p \lor q\)
   (d) \(\sim p \lor q\)
   (e) \(\sim (p \land q)\)

3. Which of the statements is \#2 a disjunction? conjunction?

4. Let \(p\) be the statement “The line \(y = -2x\) has a positive slope.” and \(q\) be the statement “The line \(y = 3\) has a slope of zero.” Write symbolic expressions of the following:
   (a) The line \(y = 3\) does not have a slope of zero.
   (b) The line \(y = -2x\) has a nonpositive slope or \(y = 3\) has a slope of zero.
   (c) It is not true that both \(y = -2x\) has a positive slope and the line \(y = 3\) has a slope of zero.

2. **Section L2**

1. Give the truth value of each statement in \#2 of the previous section. (Note that \(p\) is true and \(q\) is false).

2. Construct a truth table for each of the given statements. Indicate if a statement is a tautology or a contradiction.
   (a) \(p \lor \sim q\)
   (b) \(p \lor (\sim p \lor q)\)
   (c) \(\sim (\sim p \lor q) \land \sim r\)
   (d) \((\sim p \land q) \land (\sim q \lor p)\)

3. **Section 1.1**

1. Indicate whether each of the following is true or false:
   (a) \(\{1, 2, 3\} \subset \{1, 2\}\)
   (b) \(1 \subset \{1, 2\}\)
   (c) \(\{10\} \in \{1, 5, 10\}\)
   (d) \(10 \in \{1, 5, 10\}\)
   (e) \(\{1, 3, 9, 27\} = \{27, 9, 3, 1, 3\}\)

2. A person’s blood consists of a subset of the set of antigens: \{A, B, Rh\}.
   (a) How many different blood types are possible?
The blood types are illustrated in the Venn Diagram below:

Determine which blood type(s) are included in the following sets:

i. $B \cap \text{Rh}$
ii. $A \cap B$
iii. $(A \cup B)^c \cup \text{Rh}$
iv. $(A \cup B \cup \text{Rh})^c$
v. $A^c \cap B \cap \text{Rh}$

3. Let $U$ be the set of one-digit numbers (0-9). Let $A = \{x \in U | x \text{ is even}\}$, $B = \{x \in U | x \text{ is prime}\}$, and $C = \{x \in U | x \geq 7\}$. Describe the following sets in words, then list in roster notation:

(a) $A \cap B$
(b) $A \cup C^c$
(c) $A \cap B \cap C$
(d) $A \cap (B^c \cup C)$

4. Using the sets above, write and list the sets that represent the following descriptions:

(a) The set of digits which are odd and prime.
(b) The set of digits which are even and either prime or less than 7 or both.
(c) The set of digits which are odd or not prime or less than 7.