Week in Review #1

1. (a) not a statement
   (b) a statement (truth value is false)
   (c) a statement (truth value is true)

2. (a) i. the car is new and it is not blue.
       Alternate answer: The new car is not blue.
       ii. The car is a saturn or the car is blue.
   (b) i. \( n \land s \land \sim b \)
       ii. \( s \land (b \lor \sim n) \)

3. (a) truth table

<table>
<thead>
<tr>
<th>( p )</th>
<th>( q )</th>
<th>( \sim p )</th>
<th>( p \land q )</th>
<th>( \sim p \lor (p \land q) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>F</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>T</td>
</tr>
<tr>
<td>F</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
</tbody>
</table>

(b) truth table

<table>
<thead>
<tr>
<th>( p )</th>
<th>( q )</th>
<th>( r )</th>
<th>( \sim q )</th>
<th>( q \land r )</th>
<th>( p \land (\sim q \land r) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>T</td>
<td>T</td>
<td>F</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>F</td>
<td>T</td>
<td>F</td>
<td>T</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>T</td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>T</td>
<td>T</td>
<td>F</td>
<td>F</td>
</tr>
</tbody>
</table>

4. (a) False
   (b) True
   (c) True

5. \{E, N, C, Y, L, O, P, D, I, A\}

6. (a) \( n(A) = 4 \)
   (b) \( A \cup B = \{0, 2, 3, 4, 6, 8, 9\} \)
   (c) \( C^C = \{0, 2, 4, 6, 8\} \)
       \( A \cap C^C = \{2, 6\} \)
   (d) \( A \cap B \cap C = \phi \)
   (e) \( A \cap C = \{3, 9\} \)
       \( (A \cap C)^C = \{0, 1, 2, 4, 5, 6, 7, 8\} \)
       \( (A \cap C)^C \cap B = \{0, 2, 4, 6, 8\} \)
   (f) \( 2^5 = 32 \)
   (g) \( 2^5 - 1 = 31 \)
   (h) no, they have 0 and 6 in common.

7. (a) \( A \cup B \cup C \)

(b) \( (A \cap B) \cup C \)

8. (a) Regions: 1 and 8
   (b) Regions: 2, 3, and 6

9. (a) i. The A&M students that drink sprite or do not drink coffee.
       ii. The male students at A&M that drink Dr. Pepper or Sprite.
   (b) i. \( F \cap S \cap C^C \)
       ii. \( C \cup D^C \)

(i) yes
(j) answers may vary.
\( J = \{0, 2\}, K = \{4, 6\} \)