Week in Review #4

1. \( x + y > 20 \)  
   \( x + 2y \geq 24 \)  
   \( 3x - 2y > 0 \)

2. The corner points are labeled in the picture.

   \[
   \begin{array}{c|c|c}
   \text{c.p.} & F = 4x + 2y \\
   \hline
   A\left(\frac{8}{5}, \frac{70}{9}\right) & \frac{172}{9} \approx 19.1111 \\
   B(32,0) & 128 \\
   C(8,0) & 32 \\
   D(3,2.5) & 17 \\
   \end{array}
   \]

   The maximum value of \( F \) is 128 and occurs at point \( B \).

3. Corner points are \( D, E, \) and \( F \). Since the region is unbounded create two imaginary corner points: \( L(0,20) \) and \( K(10,7) \).

<table>
<thead>
<tr>
<th>c.p.</th>
<th>( F = 4x + 2y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>( \frac{172}{9} \approx 19.1111 )</td>
</tr>
<tr>
<td>B</td>
<td>128</td>
</tr>
<tr>
<td>C</td>
<td>32</td>
</tr>
<tr>
<td>D</td>
<td>17</td>
</tr>
</tbody>
</table>

   min value of 15

   location of minimum: point \( D \) and \( E \) and all points between them on a straight line. ie. \( DE \) or \( ED \)

4. Corner points are \( A, B, \) and \( C \). Since the region is unbounded create two imaginary corner points: \( J(0,25) \) and \( K(13,25) \)

   (a) Values:
   \[
   \begin{array}{|c|c|c|c|c|c|}
   \hline
   \text{A} & \text{B} & \text{C} & \text{J} & \text{K} \\
   \hline
   -72 & 22 & 125.5 & -75 & 55 \\
   \hline
   \end{array}
   \]

   maximum value is 125.5

   location of the maximum is \( C \).

   (b) Values:
   \[
   \begin{array}{|c|c|c|c|c|c|}
   \hline
   \text{A} & \text{B} & \text{C} & \text{J} & \text{K} \\
   \hline
   96 & 36 & 45 & 100 & 139 \\
   \hline
   \end{array}
   \]

   Since the maximum value is at the imaginary point \( K \), there is no solution for this problem.

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

6. (a) \( n(A) = 4 \)

(b) \( A \cup B = \{0, 2, 3, 4, 6, 8, 9\} \)  
   \( n(A \cup B) = 7 \)

(c) \( C^C = \{0, 2, 4, 6, 8\} \)  
   \( A \cup C^C = \{0, 2, 3, 4, 6, 8, 9\} \)

(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.

(i) yes

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

(b) \( (B \cup C)^C \)

(c) \( (A^C \cap B) \cup C \)

8. (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. \( C \cup D^C \)