Question 1A:

[Diagram with Venn diagram showing numbers and categories for Chocolate, Nuts, and Caramel: 5, 3, 8 (in Chocolate), 2, 4 (in Nuts), 1, 0 (in Caramel)]

Question 1B:

[Diagram with Venn diagram showing numbers and categories for Chocolate, Nuts, and Caramel: 6, 2, 7 (in Chocolate), 5, 3 (in Nuts), 0, 1 (in Caramel)]

Question 2A:  No Max (unbounded), min is f = 126/11 at (45/11, 12/11)
Question 2B:  No Max (unbounded), min is f = 318/31 at (16/31, 135/31)

Question 3A:  164 = 128 + 32 + 4
Question 3B:  162 = 128 + 32 + 2

Question 4A:  Max is 36” of paper when you buy 4 binders and 6 folders or 8 binders and 3 folders or 12 binders and 0 folders
Question 4B:  Max is 18” of paper when you buy 4 binders and 4 organizers or 6 binders and 2 organizers or 9 binders and 0 organizers
Question 5A:  \( x = \) # of tables made per day, \( y = \) # of chairs made per day, \( \text{Max} \ R = 90x + 40y \)

SUBJECT TO

- \( 6x + 5y \leq 60 \) (maximum daily production)
- \( y \geq 4x \) (ratio of tables:chairs)
- \( x \geq 0, \ y \geq 0 \) (non-negativity)

Question 5B:  \( x = \) # of mugs made per day, \( y = \) # of cups made per day, \( \text{Max} \ P = 3x + 2y \)

SUBJECT TO

- \( 3x + 2y \leq 240 \) (maximum daily production)
- \( x \geq 2y \) (ratio of mugs:cups)
- \( x \geq 0, \ y \geq 0 \) (non-negativity)

Question 6A:  

<table>
<thead>
<tr>
<th></th>
<th>Blk</th>
<th>Felt</th>
<th>8</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>4</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gel</td>
<td>4</td>
<td>10</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Question 6B:  

<table>
<thead>
<tr>
<th></th>
<th>Red</th>
<th>Gel</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Question 7A:  \( x = \) amt of $ in stocks, \( y = \) amt of $ in bonds.

Max \( I = 0.09x + 0.04y \)

SUBJECT TO

- \( x + y \leq 5000 \) total $ available, slack variable \( u \),
- \( x \leq 0.3(x + y) \) ratio of stocks to total with slack variable \( v \). Rearrange \( 0.7x - 0.3y \leq 0 \).
- \( x \geq 0, \ y \geq 0 \) (non-negativity)

use simplex to find that you need to invest $1500 in stocks and $3500 in bonds to earn a max of $275. All the money is invested \( u=0 \) and the maximum allowed is in stocks \( v=0 \)

Question 7B:  \( x = \) amt of $ in stocks, \( y = \) amt of $ in bonds.

Max \( I = 0.08x + 0.03y \)

SUBJECT TO

- \( x + y \leq 8000 \) total $ available, slack variable \( u \),
- \( x \leq 0.25(x + y) \) ratio of stocks to total with slack variable \( v \). Rearrange \( 0.75x - 0.25y \leq 0 \).
- \( x \geq 0, \ y \geq 0 \) (non-negativity)

use simplex to find that you need to invest $2000 in stocks and $6000 in bonds to earn a max of $340. All the money is invested \( u=0 \) and the maximum allowed is in stocks \( v=0 \)

Question 8A:  (C) no solution  (C) parametric - line segment from (8, 0) to (2, 2)

Question 8B:  (C) parametric – line segment from (0, 3) to (1.5, 0)  (C) no solution