Exam 2 Practice Problems

Part I – Linear Programming

1. A linear programming problem has an objective function \( f = 3x - 4y \) on the region
   \[
   4x + 5y \leq 20 \\
   x - 3y \leq 0 \\
   x \geq 1
   \]
   What are the maximum and minimum values of \( f \) and where are they located?

2. A linear programming problem has an objective function \( f = 2x + 8y \) on the region
   \[
   5x + 2y \geq 15 \\
   2x + 3y \geq 12 \\
   x + 4y \geq 10 \\
   x \geq 0, y \geq 0
   \]
   What are the maximum and minimum values of \( f \) and where are they located?

3. Set up the following Linear Programming problem
   Farmer Blue has 175 plots available to plant short- and long-stemmed strawberries. Each plot of long-stemmed strawberries will yield 40 baskets of strawberries and each plot of short-stemmed will yield 60 baskets of strawberries. He wants to have at least three times as many baskets of long-stemmed strawberries than he does of short-stemmed strawberries. The long-stemmed will sell for $4.00 per basket and the short-stemmed will sell for $3.00 per basket. How many plots of each type of strawberry should Farmer Blue plant to maximize his revenue?

4. A manufacturer makes two types of products: widgets and gadgets. Each widget and gadget needs to be fabricated, polished and wrapped as shown in the table below:

<table>
<thead>
<tr>
<th></th>
<th>fabrication minutes</th>
<th>polishing minutes</th>
<th>wrapping minutes</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>widget</td>
<td>9</td>
<td>12</td>
<td>11</td>
<td>$3</td>
</tr>
<tr>
<td>gadgets</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>$5</td>
</tr>
<tr>
<td>available time</td>
<td>288 minutes</td>
<td>338 minutes</td>
<td>275 minutes</td>
<td></td>
</tr>
</tbody>
</table>

How many of each type of product should be produced to realize a maximum profit? What is the maximum profit? What, if anything is leftover?