Problem

<table>
<thead>
<tr>
<th></th>
<th>inches bread</th>
<th>oz meat</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>small</td>
<td>6</td>
<td>2</td>
<td>0.80</td>
</tr>
<tr>
<td>Large</td>
<td>10</td>
<td>4</td>
<td>1.20</td>
</tr>
<tr>
<td>Supply</td>
<td>1320</td>
<td>480</td>
<td></td>
</tr>
</tbody>
</table>

\[
\begin{array}{c}
\frac{110}{12} \\
\frac{220}{16} \\
\frac{1320}{480}
\end{array}
\]

\[x = \text{# small sandwiches made each day}\]
\[y = \text{# large sandwiches made each day}\]

Maximize:

\[0.80x + 1.20y\]

subject to:

\[6x + 10y \leq 1320\]
\[2x + 4y \leq 480\]
\[x \geq 0\]
\[y \geq 0\]
Problem 2

<table>
<thead>
<tr>
<th></th>
<th>Lb Fresh Fruit</th>
<th>Lb Frozen Fruit</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deluxe</td>
<td>2.5</td>
<td>0.5</td>
<td>5</td>
</tr>
<tr>
<td>Special</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Supply</td>
<td>46</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

\[ X = \# \text{ of Salad Deluxe} \]
\[ Y = \# \text{ of Daily Special} \]

Maximize

\[ 5X + 7Y \]

Subject to

\[ 2.5X + 1Y \leq 46 \]
\[ 5X + 2Y \leq 20 \]
\[ X \geq 0 \]
\[ Y \geq 0 \]
### Problem

<table>
<thead>
<tr>
<th>Nitrile</th>
<th>Phosphate</th>
<th>Potash</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-10-5</td>
<td>25</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>8-10-10</td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Supply</td>
<td>12000</td>
<td>10000</td>
<td>7000</td>
</tr>
</tbody>
</table>

1 ton = 2000 lb

\[
\begin{align*}
\frac{2000}{6} & \leq 12000 \\
\frac{2000}{5} & \leq 10000 \\
\frac{2000}{3.5} & \leq 7000
\end{align*}
\]

\[
x = \text{# sacks of } 25-10-5 \\
y = \text{# sacks of } 8-10-10
\]

**Maximize**

\[7x + 5y\]

**Subject to**

\[
25x + 8y \leq 12000 \\
10x + 10y \leq 10000 \\
5x + 10y \leq 7000 \\
x \geq 0, \quad y \geq 0
\]
<table>
<thead>
<tr>
<th></th>
<th>minutes finishing frame</th>
<th>minutes balancing wheels</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>15</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Florida</td>
<td>10</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>Supply</td>
<td>7,200</td>
<td>7,200</td>
<td></td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\frac{120}{60} &= \frac{7200}{7200} \\
\end{align*}
\]

\[
x = \# \text{ California skates made per day} \\
y = \# \text{ Florida skates made per day}
\]

Maximize
\[
15x + 18y
\]

Subject to
\[
\begin{align*}
15x + 10y &\leq 7200 \\
5x + 20y &\leq 7200 \\
x &\geq 0 \\
y &\geq 0
\end{align*}
\]
Problem 5

<table>
<thead>
<tr>
<th></th>
<th>gal Maple Base</th>
<th>lb Sugar</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra maple syrup</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Regular maple syrup</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Supply</td>
<td>10000</td>
<td>8000</td>
<td></td>
</tr>
</tbody>
</table>

\[ x = \text{# gal Extra Maple syrup made each week} \]
\[ y = \text{# gal Regular Maple syrup made each week} \]

Maximize
\[ 5x + 3y \]

Subject to
\[ 0 \leq x \leq 1800 \]
\[ 0 \leq y \]
\[ 2x + 5y \leq 10000 \]
\[ 4x + 2y \leq 3800 \]
\[ x \geq y \]

Ref to #5, include the requirement
Problem

\[ x = \# \text{L6 material purchased from subsidiary} \]
\[ y = \# \text{L6 material purchased from incl supplier} \]

Minimize

\[ 0.8x + 1.0y \]

Subject to

\[ x + y \geq 45000 \]
\[ x \leq 35000 \]
\[ y \geq \frac{1}{2}x \]
\[ x \geq 0 \]
\[ y \geq 0 \]
<table>
<thead>
<tr>
<th></th>
<th>Lb steel</th>
<th>hours Labor</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>desk</td>
<td>75</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>filing cabinet</td>
<td>50</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Supply</td>
<td>36000</td>
<td>1500</td>
<td></td>
</tr>
</tbody>
</table>

1 ton = 2000 Lb

\[
\frac{2000}{18} = \frac{20}{36000}
\]

\[X = \# \text{ desks made}\]
\[y = \# \text{ filing cabinets made}\]

Maximize
\[20x + 15y\]

Subject to
\[x \leq 400\]
\[75x + 50y \leq 36000\]
\[2x + 3y \leq 1500\]
\[x \geq 0\]
\[y \geq 0\]
Problem

<table>
<thead>
<tr>
<th></th>
<th>gal skimmilk</th>
<th>lb sugar</th>
<th>gal cream</th>
<th>profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>regular ice cream</td>
<td>.6</td>
<td>1</td>
<td>.4</td>
<td>1</td>
</tr>
<tr>
<td>Low Cal ice cream</td>
<td>.7</td>
<td>.3</td>
<td>.4</td>
<td>1.20</td>
</tr>
<tr>
<td>Supply</td>
<td>800</td>
<td>400</td>
<td>400</td>
<td></td>
</tr>
</tbody>
</table>

\[
X = \# \text{ gal regular ice cream produced per day}
\]
\[
y = \# \text{ gal Low Cal ice cream produced per day}
\]

Maximize

\[
X + 1.2y
\]

Subject to

\[
.6X + .7y \leq 800
\]
\[
X + .3y \leq 400
\]
\[
.4x + .9y \leq 400
\]
\[
x \geq 0
\]
\[
y \geq 0
\]
Problem

<table>
<thead>
<tr>
<th></th>
<th>Lb nitrates</th>
<th>Lb phosphate</th>
<th>Lb potash</th>
<th>profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-5-5 (Lawn)</td>
<td>20</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10-15-10 (Yarden)</td>
<td>10</td>
<td>15</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>5-5-5 (Tree)</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Supply</td>
<td>14000</td>
<td>8000</td>
<td>6000</td>
<td></td>
</tr>
</tbody>
</table>

\[ \text{Profit} = 2000x + 2000y + 2000z \]

\[ x = \text{# sacks of Lawn fertilizer} \]
\[ y = \text{# sacks of Yarden fertilizer} \]
\[ z = \text{# sacks of Tree fertilizer} \]

\[ \text{Maximize} \]
\[ 6x + 4y + 3z \]

\[ \text{Subject to} \]
\[ 20x + 10y + 5z \leq 14000 \]
\[ 5x + 15y + 5z \leq 8000 \]
\[ 5x + 10y + 5z \leq 6000 \]
\[ x \geq 20 \]
\[ y \geq 200 \]
\[ z \geq 0 \]
\[ x = \# \text{ subject hours used} \]
\[ y = \# \text{ consultation minutes used} \]

Maximize
\[ x + \frac{1}{25} y \]

Subject to
\[ y \leq 50x \]
\[ y \geq 30x \]
\[ x \leq 15 \]
\[ x \geq 6 \]
\[ y \leq 200 \]
\[ x \geq 20 \]
\[ y \geq 20 \]
# Problem

## 12

<table>
<thead>
<tr>
<th></th>
<th>days guide time</th>
<th>hours support staff</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Fork</td>
<td>20</td>
<td>50</td>
<td>18000</td>
</tr>
<tr>
<td>Blue River Gorge</td>
<td>40</td>
<td>10</td>
<td>3000</td>
</tr>
<tr>
<td>Supply</td>
<td>1680</td>
<td>600</td>
<td></td>
</tr>
</tbody>
</table>

\[ X = \# \text{trips on North Fork} \]
\[ y = \# \text{trips on Blue River Gorge} \]

Maximize
\[ 18000X + 3000Y \]

Subject to
\[ X \geq 20 \quad Y \geq 20 \]
\[ Y \geq 25 \]
\[ 20X + 40Y \leq 1680 \]
\[ 50X + 10Y \leq 600 \]

Best choice is
\[ X = 7, \quad Y = 25 \]

Profit is \[ 201,000 \] $
<table>
<thead>
<tr>
<th></th>
<th># doctors</th>
<th># nurses</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>full team</td>
<td>1</td>
<td>3</td>
<td>180 inac/hr</td>
</tr>
<tr>
<td>half team</td>
<td>1</td>
<td>2</td>
<td>100 inac/hr</td>
</tr>
<tr>
<td>supply</td>
<td>200</td>
<td>450</td>
<td></td>
</tr>
</tbody>
</table>

\[
x = \# \text{ full teams} \\
y = \# \text{ half teams}
\]

\[
\text{Maximize} \\
180x + 100y
\]

subject to

\[
x + y \leq 200 \\
3x + 2y \leq 450 \\
x \geq 0 \\
y \geq 0
\]
<table>
<thead>
<tr>
<th></th>
<th>StarStreak</th>
<th>SuperStreak</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td># minutes for frame assembly</td>
<td>20</td>
<td>10</td>
<td>7200</td>
</tr>
<tr>
<td># minutes for installation</td>
<td>10</td>
<td>15</td>
<td>5400</td>
</tr>
<tr>
<td># minutes for decoration</td>
<td>14</td>
<td>18</td>
<td>4500</td>
</tr>
<tr>
<td>Profit</td>
<td>15</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

\[
\begin{align*}
120 \quad \frac{60}{60} & \quad 7200 \\
90 \quad \frac{60}{60} & \quad 5400 \\
375 \quad \frac{75}{60} & \quad 4500 \\
\end{align*}
\]

\[x = \# \text{ of StarStreak bikes made per day}\]
\[y = \# \text{ of SuperStreak bikes made per day}\]

Maximize
\[15x + 21y\]

Subject to
\[20x + 10y \leq 7200\]
\[10x + 15y \leq 5400\]
\[14x + 18y \leq 4500\]
\[x \geq 0\]
\[y \geq 0\]
\[ \begin{array}{ccc}
\text{Problem} & \text{square feet} & \text{profit} \\
& \text{lined container} & \text{liner box} & \text{in box} \\
\hline
\text{standard container} & 1 & 3 & \$0.30 \\
\text{heavy duty container} & 5 & 1 & \$0.90 \\
\text{Supply} & 5000 & 4500 & \\
\end{array} \]

\[ x = \# \text{ standard containers made each week} \]
\[ y = \# \text{ heavy duty containers made each week} \]

Maximize
\[ 0.3x + 0.9y \]

Subject to
\[ x \geq 500 \]
\[ 1x + 5y \leq 5000 \]
\[ 3x+1y \leq 4500 \]
\[ x \geq 0 \]
\[ y \geq 0 \]
With ref to #15, further require

\[ y \leq x \]

\[ y \geq 200 \]
<table>
<thead>
<tr>
<th></th>
<th>oz plastic</th>
<th>minutes for clothes</th>
<th>minutes for Spi features</th>
<th>dollar Profit per doll</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scary Harry</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1.00</td>
</tr>
<tr>
<td>Horrible Harriet</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1.25</td>
</tr>
<tr>
<td>Glob</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>1.50</td>
</tr>
</tbody>
</table>

Supply | 160 | 50 | 50 |

\[
x = \text{# Scary Harry dolls made per hour}
\]

\[
y = \text{# Horrible Harriet dolls made per hour}
\]

\[
z = \text{# Globs made per hour}
\]

Maximize

\[
1x + 1.25y + 1.50 z
\]

Subject to

\[
4x + 3y + 9z \leq 160
\]

\[
3x + 4y + z \leq 50
\]

\[
2x + 4y + 3z \leq 50
\]

\[
x \geq 0
\]

\[
y \geq 0
\]

\[
z \geq 0
\]
<table>
<thead>
<tr>
<th></th>
<th>oz plastic</th>
<th>minutes for clothes</th>
<th>minutes for 5 features</th>
<th>dollar profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scary Harry</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>1.10</td>
</tr>
<tr>
<td>Horrible Harriet</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1.30</td>
</tr>
<tr>
<td>Glob</td>
<td>10</td>
<td>1</td>
<td>6</td>
<td>2.00</td>
</tr>
<tr>
<td>Supply</td>
<td>192</td>
<td>55</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

\[
x = \text{# Scary Harry dolls made per hour} \\
\gamma = \text{# Horrible Harriet dolls made per hour} \\
\zeta = \text{# Globs made per hour}
\]

Maximize
\[
1.1x + 1.3\gamma + 2.0\zeta
\]

Subject to
\[
5x + 3\gamma + 10\zeta \leq 192 \\
2x + 4\gamma + \zeta \leq 55 \\
3x + 4\gamma + 6\zeta \leq 45 \\
x \geq 0 \\
\gamma \geq 0 \\
\zeta \geq 0
\]
Problem 19

Referring to problem 18

For \( x = 5, \quad y = 5, \quad z = 10 \)

\[
5(5) + 3(5) + 10(10) \leq 192
\]

\[
2(5) + 4(5) + 1(10) \leq 55
\]

\[
3(5) + 4(5) + 6(10) \leq 45 \quad \text{NO}
\]

Not feasible

For \( x = 10, \quad y = 3, \quad z = 2 \)

\[
5(10) + 3(3) + 10(2) \leq 192
\]

\[
2(10) + 4(3) + 1(2) \leq 55
\]

\[
3(10) + 4(3) + 6(2) \leq 45 \quad \text{NO}
\]

Not feasible
Problem 20

<table>
<thead>
<tr>
<th></th>
<th>Lb Liner 6d</th>
<th>Lb Finish 6d</th>
<th>Hours Labor</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Shipping box</td>
<td>(\frac{3}{2})</td>
<td>(\frac{3}{10})</td>
<td>(\frac{2}{100})</td>
<td>.04</td>
</tr>
<tr>
<td>1 mailing tube</td>
<td>(\frac{1}{12})</td>
<td>(\frac{1}{20})</td>
<td>(\frac{1}{300})</td>
<td>.01</td>
</tr>
<tr>
<td>1 retail box</td>
<td>(\frac{6}{10})</td>
<td>(\frac{9}{10})</td>
<td>(\frac{1}{20})</td>
<td>.10</td>
</tr>
<tr>
<td>Supply</td>
<td>300</td>
<td>120</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

\[x = \text{# Shipping boxes made each day}\]
\[y = \text{# mailing tubes made each day}\]
\[z = \text{# retail boxes made each day}\]

Maximize

\[.04x + .01y + .10z\]

Subject to

\[\frac{3}{2}x + \frac{1}{12}y + \frac{6}{10}z \leq 300\]
\[\frac{3}{10}x + \frac{1}{20}y + \frac{9}{10}z \leq 120\]
\[\frac{2}{100}x + \frac{1}{300}y + \frac{1}{20}z \leq 10\]
<table>
<thead>
<tr>
<th>Problem</th>
<th># Worms</th>
<th># Minnows</th>
<th># Grasshoppers</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25</td>
<td>10</td>
<td>10</td>
<td>1.00</td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>15</td>
<td>25</td>
<td>1.75</td>
</tr>
<tr>
<td>C</td>
<td>50</td>
<td>5</td>
<td>5</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Supply: 1000, 250, 300

\[ \begin{align*} 
  x &= \text{# Bait packages type A} \\
  y &= \text{# Bait packages type B} \\
  z &= \text{# Bait packages type C} \\
\end{align*} \]

Maximize
\[ 1.00x + 0.75y + 1.25z \]

Subject to
\[ \begin{align*} 
  25x + 10y + 50z &\leq 1000 \\
  10x + 15y + 5z &\leq 250 \\
  10x + 25y + 5z &\leq 300 \\
  x &\geq 0 \\
  y &\geq 0 \\
  z &\geq 0 
\end{align*} \]
<table>
<thead>
<tr>
<th></th>
<th># hrs creative</th>
<th># hrs tech</th>
<th># hrs editing</th>
<th>dollar profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science fiction</td>
<td>16</td>
<td>14</td>
<td>5</td>
<td>200</td>
</tr>
<tr>
<td>Fantasy games</td>
<td>10</td>
<td>20</td>
<td>1</td>
<td>150</td>
</tr>
<tr>
<td>Supply</td>
<td>504</td>
<td>756</td>
<td>135</td>
<td></td>
</tr>
</tbody>
</table>

\[
x = \text{# scenario of Sci-Fi games created}
\]
\[
y = \text{# scenario of Fantasy games created}
\]

Maximize
\[
200x + 150y
\]
subject to
\[
16x + 10y \leq 504
\]
\[
14x + 20y \leq 756
\]
\[
5x + 1y \leq 135
\]
\[
x \geq 0
\]
\[
y \geq 0
\]
\[
z \geq 0
\]
### Problem

<table>
<thead>
<tr>
<th></th>
<th>#hrs assembly</th>
<th>#hrs painting</th>
<th>#hrs lockinst</th>
<th>dollar Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 small No locks</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>100 small with look</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>100 med with lock</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>100 large with lock</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Supply</td>
<td>8</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

\[ X = \text{# small widgets without lock (in 100's)} \]
\[ Y = \text{# small widgets with lock (in 100's)} \]
\[ Z = \text{# med widgets with lock (in 100's)} \]
\[ W = \text{# large widgets with lock (in 100's)} \]

Maximize

\[ 2X + 10Y + 11Z + 20W \]

subject to

\[ X + 2Y + 3Z + 6W \leq 8 \]
\[ X + 5Y + 7Z + 8W \leq 9 \]
\[ 0X + 3Y + Z + 4W \leq 2 \]
\[ X \geq 0, Y \geq 0, Z \geq 0 \]
<table>
<thead>
<tr>
<th></th>
<th>Regular Cuba</th>
<th>Deluxe Cuba</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nina</td>
<td>500</td>
<td>200</td>
<td>100,000</td>
</tr>
<tr>
<td>Pista</td>
<td>400</td>
<td>400</td>
<td>120,000</td>
</tr>
<tr>
<td>Santa María</td>
<td>800</td>
<td>500</td>
<td>180,000</td>
</tr>
<tr>
<td>Demand</td>
<td>12,000</td>
<td>8,000</td>
<td></td>
</tr>
</tbody>
</table>

\[ x = \text{# weeks scheduled for Nina} \]
\[ y = \text{# weeks scheduled for Pinta} \]
\[ z = \text{# weeks scheduled for Santa María} \]

Minimize

\[ 100,000x + 120,000y + 180,000z \]

Subject to

\[ 500x + 400y + 800z \geq 12,000 \]
\[ 200x + 400y + 500z \geq 8,000 \]
\[ x \geq 0 \]
\[ y \geq 0 \]
\[ z \geq 0 \]
<table>
<thead>
<tr>
<th>25</th>
<th>oz dates</th>
<th>oz apricots</th>
<th>oz candied fruit</th>
<th>dollar Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deluxe pack</td>
<td>16</td>
<td>24</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Special pack</td>
<td>20</td>
<td>12</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Standard pack</td>
<td>16</td>
<td>8</td>
<td>0</td>
<td>1.5</td>
</tr>
<tr>
<td>Supply</td>
<td>1200</td>
<td>900</td>
<td>360</td>
<td></td>
</tr>
</tbody>
</table>

\[ x = \# \text{ Deluxe packs produced} \]
\[ y = \# \text{ Special packs produced} \]
\[ z = \# \text{ Standard packs produced} \]

Maximize
\[ 3x + 2y + 1.5z \]

Subject to
\[ 16x + 20y + 16z \leq 1200 \]
\[ 24x + 12y + 8z \leq 900 \]
\[ 12x + 3y + 0z \leq 360 \]
\[ x \geq 0 \]
\[ y \geq 0 \]
\[ z \geq 0 \]
26. Referring to Problem 25, also require

\[ y \geq 20 \]

\[ x \leq 30 \]
<table>
<thead>
<tr>
<th>Type</th>
<th># tulips</th>
<th># daffodils</th>
<th># flowering shrubs</th>
<th>dollar profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>30</td>
<td>20</td>
<td>4</td>
<td>50</td>
</tr>
<tr>
<td>Type 2</td>
<td>10</td>
<td>40</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Type 3</td>
<td>20</td>
<td>50</td>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>Supply</td>
<td>1000</td>
<td>800</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

\[
x = \text{# type 1 layout used} \\
y = \text{# type 2 layout used} \\
z = \text{# type 3 layout used}
\]

Maximize

\[50x + 30y + 60z\]

Subject to

\[
\begin{align*}
30x + 10y + 20z & \leq 1000 \\
20x + 40y + 50z & \leq 800 \\
4x + 3y + 2z & \leq 100 \\
x & \geq 0 \\
y & \geq 0 \\
z & \geq 0
\end{align*}
\]
28. Ref to #27, also require

\[ x \leq y \]

\[ x \geq 5, \quad y \geq 5, \quad z \geq 5 \]
<table>
<thead>
<tr>
<th>Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>hrs Labor</th>
<th>hrs Machine time</th>
<th>dollar profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>furniture</td>
<td>100</td>
<td>20</td>
<td>500</td>
</tr>
<tr>
<td>plywood</td>
<td>80</td>
<td>30</td>
<td>400</td>
</tr>
<tr>
<td>pulpwood</td>
<td>50</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>Supply</td>
<td>1000</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

\[x = \text{# units timber in furniture}\]
\[y = \text{# units timber in plywood}\]
\[z = \text{# units timber in pulpwood}\]

Maximize

\[500x + 400y + 200z\]

Subject to

\[100x + 80y + 50z \leq 1000\]
\[20x + 30y + 30z \leq 500\]
\[x \geq 0\]
\[y \geq 0\]
\[z \geq 0\]
### Problem

<table>
<thead>
<tr>
<th></th>
<th>units A</th>
<th>units B</th>
<th>units C</th>
<th>dollar cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>5</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>8</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>12</td>
<td>30</td>
<td>50</td>
</tr>
</tbody>
</table>

Min req: 300 A, 20 B, 100 C

\[
\begin{align*}
\text{x} &= \text{# units food 1 used} \\
\text{y} &= \text{# units food 2 used} \\
\text{z} &= \text{# units food 3 used}
\end{align*}
\]

**Minimize**

\[40x + 20y + 50z\]

**Subject to**

\[
\begin{align*}
100x + 60y + 100z & \geq 300 \\
5x + 8y + 12z & \geq 20 \\
20x + 10y + 30z & = 100 \\
x & \geq 0 \\
y & \geq 0 \\
z & \geq 0
\end{align*}
\]