OUR DIET PROBLEM

PROBLEM STATEMENT AND DATA

Let’s assume that I am a moderately active person and weigh around 120 pounds.

Daily Requirements
  • Total Calorie Intake = 2,000
  • Total Carbohydrates = 271 grams
  • Total Protein = 91 grams
  • Total Fat = 65 grams

Half of my daily requirements from dinner
  • Total Calorie Intake = 1,000
  • Total Carbohydrates = 135.5 grams
  • Total Protein = 45.5 grams
  • Total Fat = 32.5 grams

Calorie Intake from one serving of Green beans
  • 12 grams of Carbohydrates
  • 3 grams of Protein
  • 9 grams of Fat
  • Cost = $2.0

Calorie Intake from one serving of Kisir
  • 33 grams of Carbohydrates
  • 6 grams of Protein
  • 1 gram of Fat
  • Cost = $1.5
### OPTION 1 – EATING 33 SERVINGS OF GREEN BEANS

<table>
<thead>
<tr>
<th></th>
<th>Carbs</th>
<th>Protein</th>
<th>Fat</th>
<th>Calories</th>
<th>Cost / serving</th>
<th>Decision variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green beans</td>
<td>12</td>
<td>3</td>
<td>9</td>
<td>171</td>
<td>$2.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Kisir</td>
<td>33</td>
<td>6</td>
<td>1</td>
<td>150</td>
<td>$1.50</td>
<td>0</td>
</tr>
<tr>
<td>Daily intake</td>
<td>192</td>
<td>48</td>
<td>144</td>
<td>2,736</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily requirement</td>
<td>135.5</td>
<td>45.5</td>
<td>32.5</td>
<td>1,000</td>
<td>Total cost</td>
<td>$32.0</td>
</tr>
</tbody>
</table>

### OPTION 2 – EATING 16 SERVINGS OF KISIR

<table>
<thead>
<tr>
<th></th>
<th>Carbs</th>
<th>Protein</th>
<th>Fat</th>
<th>Calories</th>
<th>Cost / serving</th>
<th>Decision variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green beans</td>
<td>12</td>
<td>3</td>
<td>9</td>
<td>171</td>
<td>$2.0</td>
<td>0</td>
</tr>
<tr>
<td>Kisir</td>
<td>33</td>
<td>6</td>
<td>1</td>
<td>150</td>
<td>$1.50</td>
<td>33.0</td>
</tr>
<tr>
<td>Daily intake</td>
<td>1,089</td>
<td>198</td>
<td>33</td>
<td>4,950</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily requirement</td>
<td>135.5</td>
<td>45.5</td>
<td>32.5</td>
<td>1,000</td>
<td>Total cost</td>
<td>$49.5</td>
</tr>
</tbody>
</table>
MATHEMATICAL FORMULATION

Let’s denote

\[ x_1 = \text{Green beans} \]
\[ x_2 = \text{Kisir} \]
\[ z = \text{Cost} \]

Minimize \[ z = \$2.0 \times x_1 + \$1.5 \times x_2 \]

\[ 12 \times x_1 + 33 \times x_2 \geq 135.5 \quad \text{(Carbohydrates)} \]
\[ 3 \times x_1 + 6 \times x_2 \geq 45.5 \quad \text{(Protein)} \]
\[ 9 \times x_1 + x_2 \geq 32.5 \quad \text{(Fat)} \]
\[ 171 \times x_1 + 150 \times x_2 \geq 1,000 \quad \text{(Calories)} \]
\[ x_1 \geq 0 \quad \text{(Green beans)} \]
\[ x_2 \geq 0 \quad \text{(Kisir)} \]