

Andrew Rutherford

CSCI 3104

CPU: 2.8 GHz Intel Core i7

Ram: 16 GB 1600 MHz DDR3

OSX Yosemite

Homework #8

On my honor, as a University of Colorado at Boulder student, I have neither given nor received any unauthorized help.

$$\text{Profit} = \text{selling price} - (\text{cereal prod cost} + \text{meat prod cost} + \text{pkg cost})$$

$$\text{Frisky pup} = x_1$$

$$\text{Hirsley Hound} = x_2$$

$$\text{Profit}(x_1) = 7 - (1 + 3 + 1.4) = \$1.60$$

$$\text{Profit}(x_2) = 6 - (2 + 2 + 0.6) = \$1.40$$

Constraints:

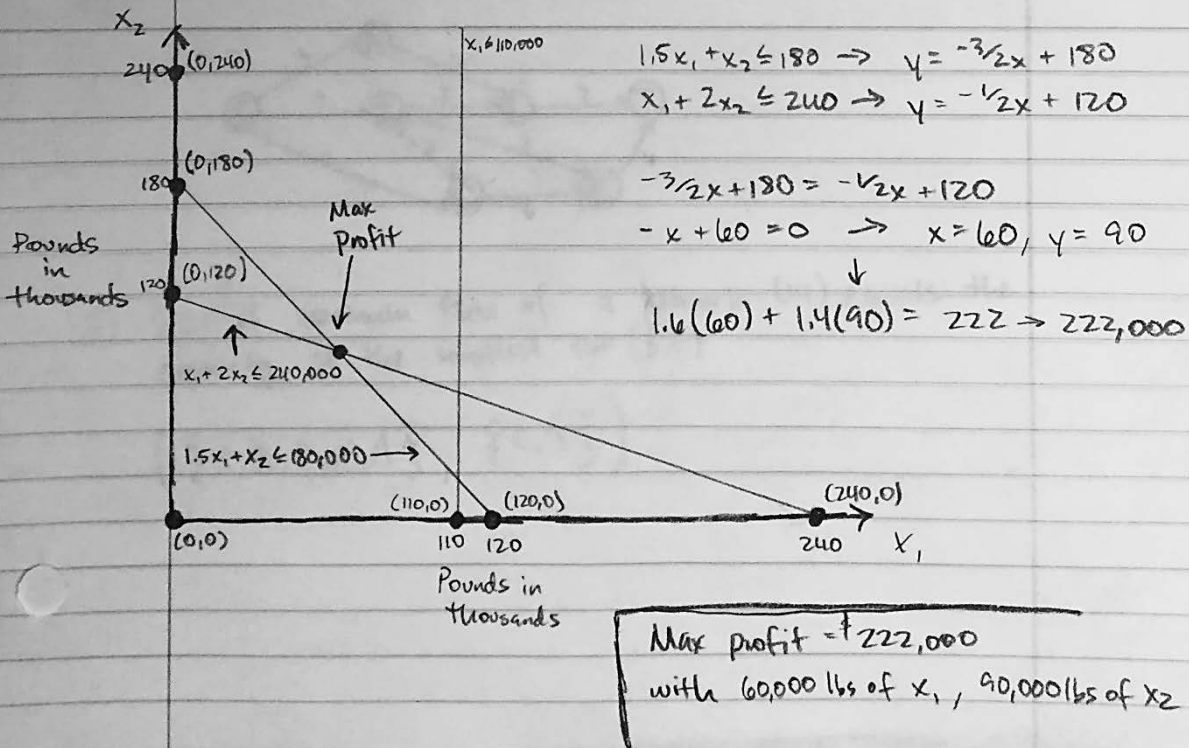
$$\text{Cereal: } x_1 + 2x_2 \leq 240,000$$

$$\text{Meat: } 1.5x_1 + x_2 \leq 180,000$$

$$\text{Bags of } x_1: x_1 \leq 110,000$$

$$\text{Bags cannot be negative: } x_1, x_2 \geq 0$$

$$\text{Max Profit: } \max 1.6x_1 + 1.4x_2$$



2.

Which is the objective of the function? Minimize

Function: X_1 + X_2 + X_3 + X_4 + X_5

Constraints:

<input type="text" value=".85"/>	X_1	+	<input type="text" value="1.63"/>	X_2	+	<input type="text" value="12.79"/>	X_3	+	<input type="text" value="8.38"/>	X_4	+	<input type="text" value="0"/>	X_5	\geq	<input type="text" value="15"/>
<input type="text" value=".33"/>	X_1	+	<input type="text" value=".2"/>	X_2	+	<input type="text" value="1.58"/>	X_3	+	<input type="text" value="1.39"/>	X_4	+	<input type="text" value="100"/>	X_5	\geq	<input type="text" value="2"/>
<input type="text" value=".33"/>	X_1	+	<input type="text" value=".2"/>	X_2	+	<input type="text" value="1.58"/>	X_3	+	<input type="text" value="1.39"/>	X_4	+	<input type="text" value="100"/>	X_5	\leq	<input type="text" value="6"/>
<input type="text" value="4.65"/>	X_1	+	<input type="text" value="2.37"/>	X_2	+	<input type="text" value="73.68"/>	X_3	+	<input type="text" value="80.7"/>	X_4	+	<input type="text" value="0"/>	X_5	\geq	<input type="text" value="4"/>
<input type="text" value="9"/>	X_1	+	<input type="text" value="8"/>	X_2	+	<input type="text" value="7"/>	X_3	+	<input type="text" value="506.4"/>	X_4	+	<input type="text" value="0"/>	X_5	\leq	<input type="text" value="100"/>
<input type="text" value="1"/>	X_1	+	<input type="text" value="-1"/>	X_2	+	<input type="text" value="-1"/>	X_3	+	<input type="text" value="1"/>	X_4	+	<input type="text" value="1"/>	X_5	\geq	<input type="text" value="0"/>

$X_1, X_2, X_3, X_4, X_5 \geq 0$

Variables:

X_1 = tomato, X_2 = lettuce, X_3 = spinach, X_4 = carrot, X_5 = oil

Optimal Solution:

5.8845 portions of tomato

5.8481 portions of lettuce

.03642 portions of spinach

0 portions of carrots

0 portions of oil.

Constraints:

Protein at least 15g

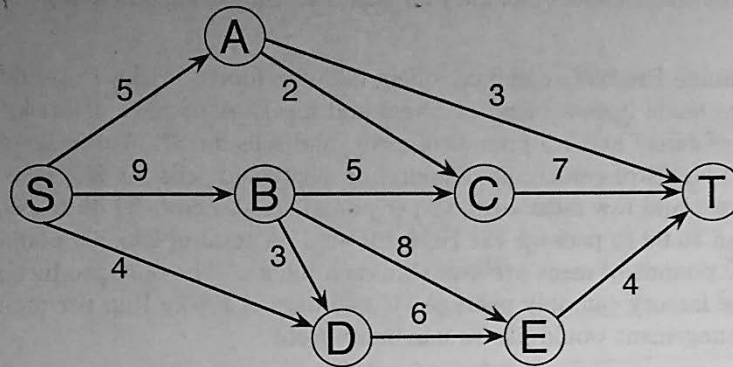
Fats between 2g and 6g

Carbs at least 4g

Sodium at most 100g

At most 50% greens by mass

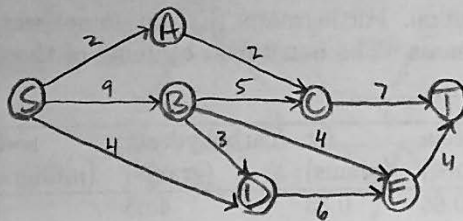
Source: <http://www.phpsimplex.com/simplex>



a) $(S \rightarrow A \rightarrow T)$

b) Maximum flow of $(S, T) = 3$

c)



d) Size of maximum flow of a network (14) equals the capacity of the smallest cut (S, t)

$(\{S, B, D, E, A\}, \{C, T\})$