IS609 Homework Week 6

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October 1, 2015

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2) A rancher has determined that the minimum weekly nutritional requirements for an average-sized horse include 40lb of protein, 20lb of carbohydrates, and 45lb of roughage. These are obtained from the following sources in varying amounts at the prices indicated:

	Protein (lb)	Carbohydrates (lb)	Roughage (lb)	Cost
Hay (per bale)	0.5	2.0	5.0	$1.80
Oats (per sack)	1.0	4.0	2.0	3.50
Feeding blocks (per block)	2.0	0.5	1.0	0.40
High-protein concentrate (per sack)	6.0	1.0	2.5	1.00
Requirements per horse (per week)	40.0	20.0	45.0	

Formulate a mathematical model to determine how to meet the minimum nutritional requirements at minimum cost.

Amounts of all the different feed types are paramaters in the model.

Minimize $Cost(H, T, F, P) = 1.8H + 3.5T + 0.4F + 1.0P$

This is subjec to following:

Protein: $0.5H + 1.0T + 2.0F + 6.0P >= 40.0$

Carbs: $2.0H + 4.0T + 0.5F + 1.0P >= 20.0$

Roughage: $5.0H + 2.0T + 1.0F + 2.5P >= 25.0$

$H, T, F, P >= 0$

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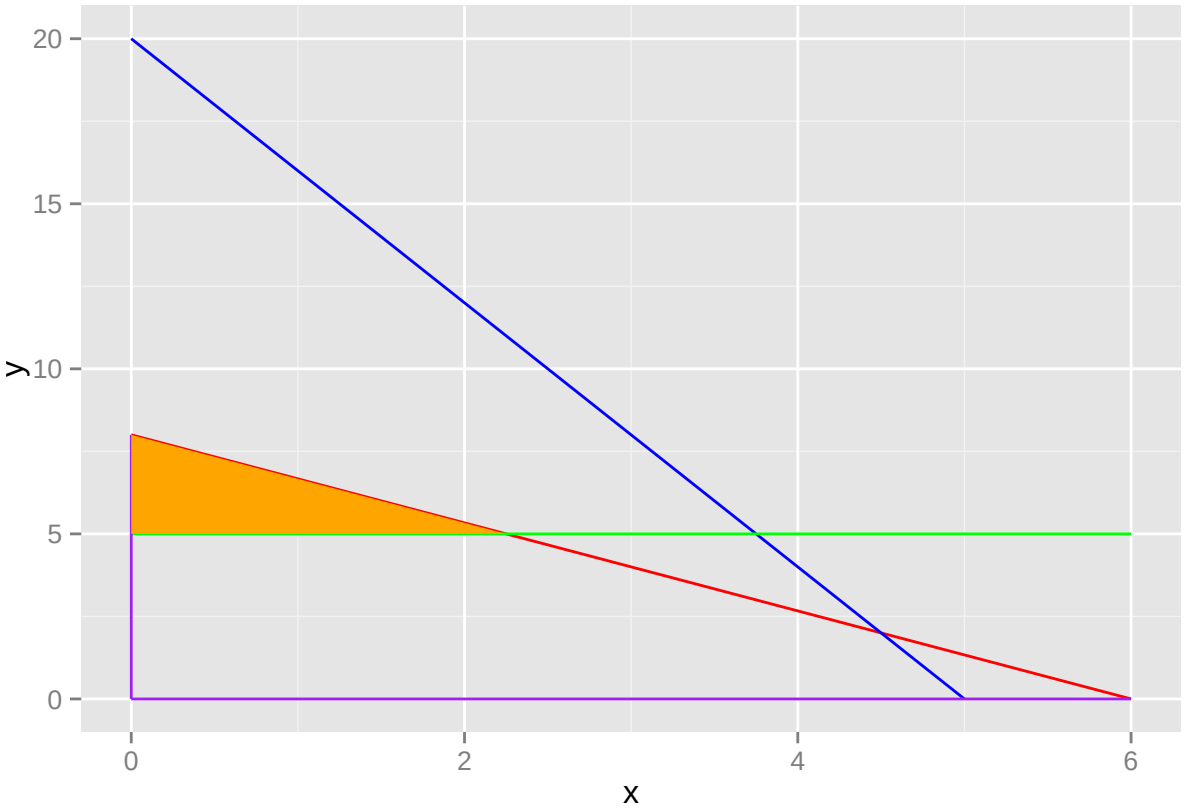
6) Use graphical analysis to Maximize 10x + 35y subject to:

8x + 6y <= 48 (board-feet of lumber)

4x = y <= 20 (hours of carpentry)

y >= 5 (demand)

x,y, >= 0 (nonnegativity)



The extreme points are:

The intersection of constraint 1 and 5 at point (0,8)

The intersection of constraint 1 and 3 at point (2.25, 5)

The intersection of constraint 3 and 5 at point (0,5)

Plug them into the objective equation : $(10 * x) + (35 * y)$ to find the maximum which is *(0,8) with value of 280.0.*

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6) Using the method in section 7.3, Maximize 10x + 35y subject to:

8x + 6y <= 48 (board-feet of lumber)

4x = y <= 20 (hours of carpentry)

y >= 5 (demand)

x,y, >= 0 (nonnegativity)

Decision Variables to format xi