Donovan Guelde
dogu7023
CSCI-3104
Assignment 8

1. A = units frisky pup produced/sold

   B = units husky hound produced/sold

   Production Cost of Frisky Pup = (1A)*1 + (1.5A)*2 = 4

   Production Cost of Husky Hound = (2B)*1 + (1B)*2 = 4

   Profit for Frisky Pup = (7-4-1.4)A = 1.6A

   Profit for Husky Hound = (6-4-.6)B = 1.4B

   Total Profit = 1.6A + 1.4B

   Objective: Max(1.6A + 1.4B)

   Constraints:

   0 <= A <= 110,000 (max of 110,000 units of Frisky Pup packaged/month)

   0 <= B

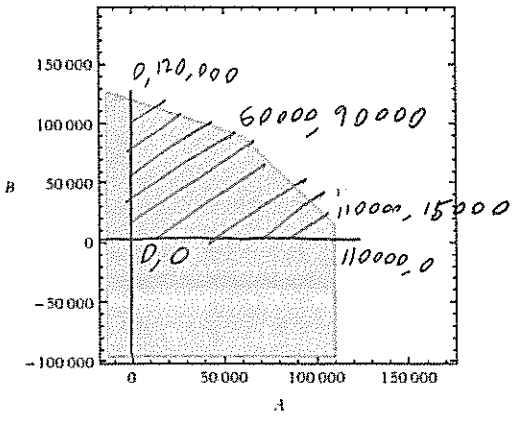
   A + 2B <= 240,000 (240,000 pounds cereal available)

   1.5A + B <= 180,000 (180,000 pounds meat available)

Input interpretation:

plot $A \leq 110\,000$, $A + 2B \leq 240\,000$, $1.5A + B \leq 180\,000$

Inequality plot



Download page

POWERED BY THE WOLFRAM LANGUAGE

Max profit at (60,000, 90,000)
= $222,000

*wolframalpha.com

Donovan Guelde
dogu7023
CSCI-3104
Assignment 8

2. variables:

x1 = units tomato, x2 = units lettuce, x3 = units spinach, x4 = units carrots,

x5 = units oil

constraints:

x1, x2, x3, x4, x5 >= 0 (all amounts >= 0)

x1*.85 + x2*1.63 + x3*12.79 + x4*8.38 + x5*0.00 >= 15 (at least 15 protein)

x1*0.33 + x2*0.2 + x3*1.58 + x4*1.39 + x5*100 >= 2 (at least 2 fat)

x1*0.33 + x2*0.2 + x3*1.58 + x4*1.39 + x5*100 <= 6 (at most 6 fat)

x1*4.65 + x2*2.37 + x3*73.68 + x4*80.70 + x5*0>= 4 (at least 4 carbs)

x1*9 + x2*8 + x3*7 + x4*506.4 + x5*0 <= 100 (at most 100 sodium)

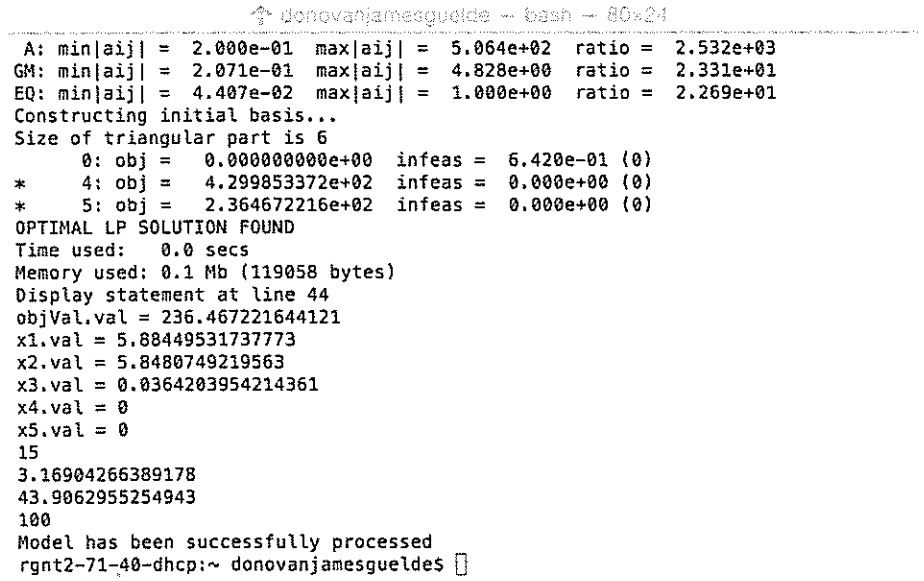
x2 + x3 - x1 - x4 - x5 <= 0 (less than 50% greens)

objective: minimize (x1*21 + x2*17 + x3*370+x4*345 + x5*883)

Solution: 588.4 grams tomato, 584.8 grams lettuce, 3.6 grams spinach, 0 grams carrot, 0 grams oil;

236.5 calories, 15 grams protein, 3.17 grams fat, 43 grams carbohydrates, 100 milligrams sodium

Solved with glpsol (GLPK):

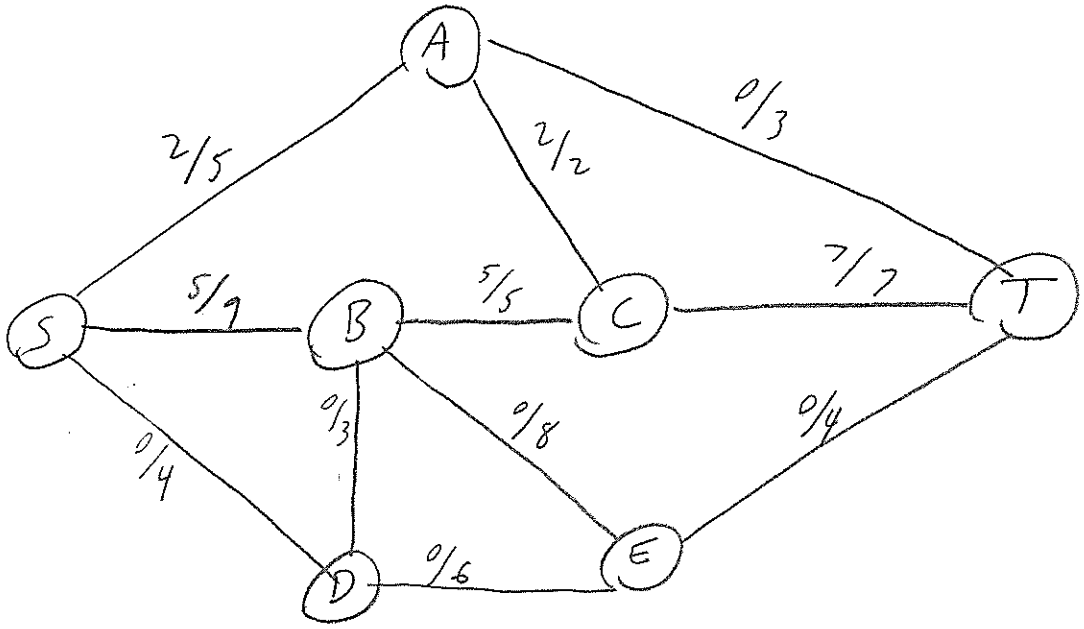


Donovan Guelde
dogu7023
CSCI-3104
Assignment 8

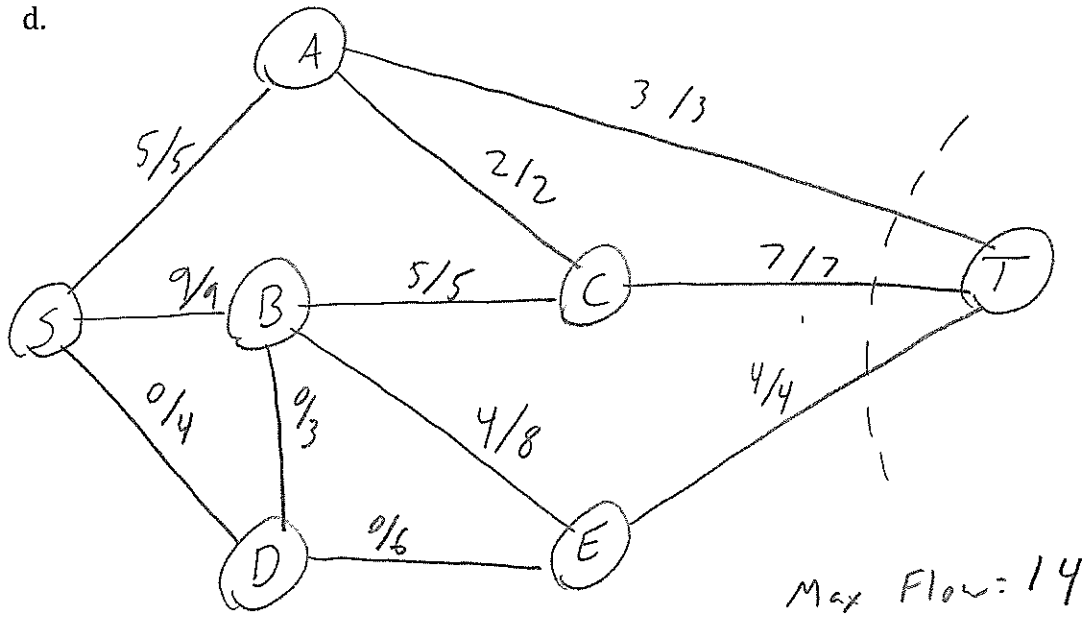
3. a. Augmenting Path S->B->C->T, flow rate of 5 (B->C has capacity 5, smallest in path)

   b. Can increase this path by 2 (C->T is currently rate=5, capacity=7)

   c.



   d.



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