

Math-589 Homework #1 (Practical application of linear programming)

I will finish the homework before 3pm Oct 31. I will type the solution.

Story: Your lecturer wishes to save some money because he wishes to buy new Wii U console. He thinks that he may save on food. Suppose that he is your customer and he will pay you in credits needed to pass MATH-589, if he will be happy with your result. Like any other customer, he does not really know what he wants. He wants to save money, eat enough of the basic nutrients. His weight is 160lb after dinner he is almost 30 year old.

How to do it:

- Considered nutrients (un)saturated fat, calories, fibers, iron, salt, proteins, and carbs.
- Find out what is his and yours recommended daily intake of the nutrients.
- Go to your favorite shops (Walmart, Meijer's, Schnuks, County Market, random Korean store, McDonalds, Target, other Fast Food - these are the shops where the lecturer is willing to go shopping) and pick at least 20 different kinds of food. (*Not 19x cookies! Give some variety, at most 4 items from Fast Food chain.*)
- Summarize what is the amount of the nutrients in each of the food.
- Formulate a linear program for finding a diet for one year such that:
 - the cost of food is minimized
 - he(you) get at least recommended daily intake (salt times 1.5)
- Find a software package which can solve your (*LP*).
 - use google (type linear programming solver)
 - try <http://scip.zib.de> for command line tool, <http://www2.isye.gatech.edu/~wcook/qsopt/> seems to have some GUI, it seems that Mathematica can solve a linear program and even Spread sheet tool can do linear programming.
- Solve your Diet problem using the solver for him as well as for yourself
- Try to check the solution of dual and determine costs of the nutrients.
- Summarize the results.

More notes - provide references (http links) to anything you are using. Include also the formulation of (*LP*) which you were using as an input for your solver (maybe as a separate file). Also briefly describe how to use the solver and what you liked and hated about it. It is assumed that the homework will be typed. If the output of the solver is that the program has no solution, then you did not formulate the program correctly or you require some constraint like say salt is at least 5mg but no food has salt.