

Math-566 Homework #1 (*Practical* application of linear programming)

I will finish this homework before 12:30pm Aug 30. I will type the solution (means not ugly hand written) and submit on Canvas.

Story: Your lecturer wishes to save some money because his family is about to get bigger. 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-566, if he is 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 180lb, height 180cm, and he is around 35 years old.

How to do it:

- Consider at least four nutrients out of (un)saturated fat, calories, fibers, iron, salt, proteins, and carbs.
- Find out the recommended daily intake (RDI) of the nutrients for his body weight and age.
- Go to your favorite food shop(s) in Ames (Walmart, Target, Aldi, Fareway, . . . , McDonalds, Panda Express other fast food - these are the shops where the lecturer is willing to go shopping) and pick at least 15 different kinds of food. (*Not 15× cookies! Give some variety, at most 4 items from fast food chains.*)
- Summarize what is the amount of the nutrients in each of the food.
- Formulate a linear program (LP) for finding a diet for time of one year such that:
 - the cost of food is minimized
 - he meets the recommended daily intake
- Solve (LP) using some (LP) solver - for example <http://apmonitor.com>, Mathematica, Sage or Excel.
- Summarize the results. What is the cost for the whole year as well as for just one day?
- Solve the diet problem for yourself too! (change recommended daily intakes to your body and age, solve resulting (LP), summarize results)
- What changes in your solution if you add constraints that no nutrition exceeds the RDI more than twice?

More notes - provide references ([http](#) links) to anything you are using. Include also the formulation of the (LP) which you were using as an input for your solver. 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. For example, you require some constraint like say salt is at least 5mg but no food has salt.

Bon Appétit!