**BME 6310**

**Fall 2021**

**Homework #3 – Due 11am, Monday, September 27, 2021**

**Remember to show all your work. Submit one pdf with answers to all problems, including your MATLAB code, example figures, calculations, etc. Please also submit your individual code files too for reference.**

1. ~~Read~~ [~~http://circ.ahajournals.org/content/117/13/1732.full~~](http://circ.ahajournals.org/content/117/13/1732.full) ~~and write ~4 sentences summarizing what you learned and considerations to be made in the use of multilinear regression.~~
2. ~~Identify a collection of data from a source online to which you can apply multilinear regression. Demonstrate its value.~~

~~Must we apply the multi-linear regression?~~

1. ~~Identify a collection of data from a source online to which you would want to fit an exponential function, linearize the data, apply the least-squares fit approach, back-calculate the parameters of the exponential function and demonstrate how it is a fit to your non-transformed data.~~
2. Take an image of relevance to your interest area, decimate it at 3 different levels, and generate the interpolating images.
3. ~~Do 2 steepest descent steps for:~~

~~f(~~**~~x~~**~~) = x~~~~1~~~~2~~ ~~+ 2x~~~~2~~~~2~~ ~~– x~~~~1~~ ~~– 6x~~~~2~~

**~~x~~**~~0 = [0 0]~~~~T~~

~~and demonstrate the use of a built-in optimization function in python/Matlab~~~~to solve this problem.~~

1. Use an online applet to solve the following problem. Use the online applet to test your answer. Illustrate that all the constraints are satisfied. Illustrate that any change in one of the variables, while still satisfying the constraints, results in a less-than-optimal solution.

Maximize f = 2x1 + 3x2 + x3, subject to

x1 + x2 + x3 ≤ 4.8

10x1 + x3 ≤ 9.9

x2 - x3 ≤ 0.2

1. Solve problem #6 with a built-in linear programmingfunction in python/Matlab. Develop some kind of iterative component to your function to illustrate changes in the result as you modify the objective function or constraints. For example, how does the maximum value of the objective function change as you vary the 1st constraint from 1 to 10?
2. Make use of one of these optimization techniques for a problem you define from your own area of interest.