MECH 5130 Theory of Finite Element Method
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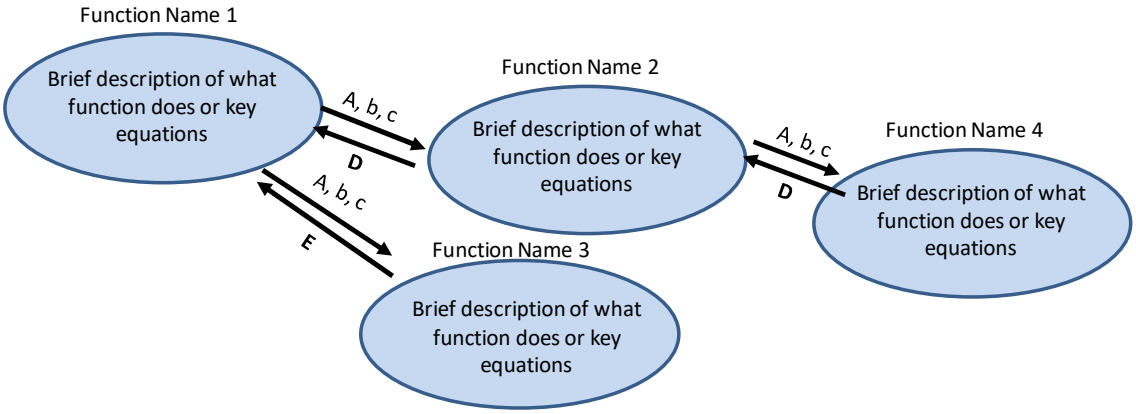
Homework 1: Abstraction

Given the 5 functions (f1-f5), and the live script provided (HW1.mlx), you will write a script to plot all the functions as shown in the live script. **Complete (1) and (2) for pre-homework submission.**

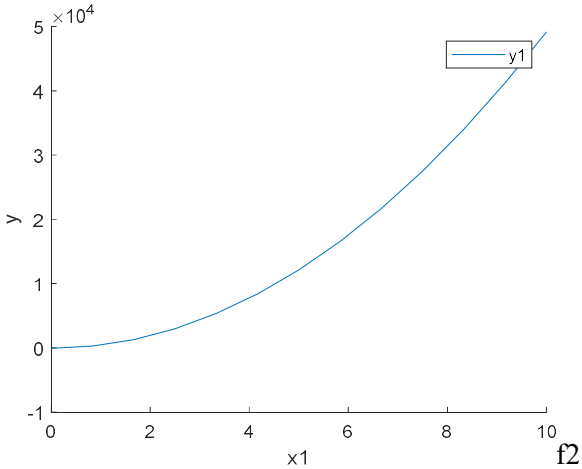
(1) Create a "bubble diagram" of the functions needed to plot the functions. Make sure to find the most abstract tasks (true for f1-f5) and create one bubble chart that works for all of the functions. Show the interdependency of the functions, using arrows connecting functions as shown below, where an incoming arrow should be labelled with the inputs for the function and an outgoing arrow labeled with the outputs. Indicate in RED the functions which will need to be customized for each element.



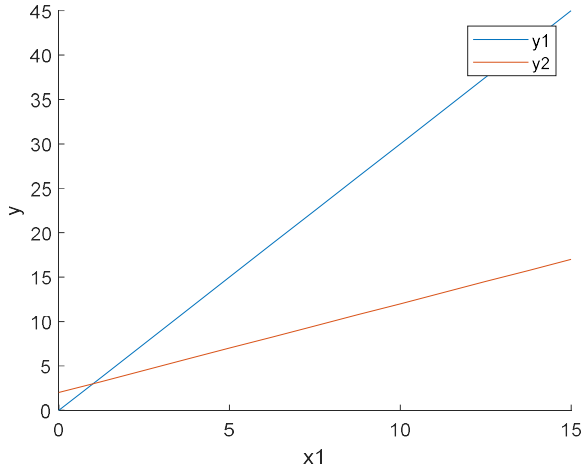
(2) Write pseudo-code for each of the functions in the bubble chart. Get to enough detail that you have worked out all the indices and dimensions of any arrays needed. Look up key functions needed and show that the arrays you give to the functions are in the right form.

(3) Write out your code, debug it, and run it. All two-dimensional functions (x has two dimensions) should be plotted in a contour plot. All one-dimensional functions should be in line or scatter plots. Reproduce the plots shown below. Make sure that it will work for any function that has up to two dimensional inputs (x) and n outputs (y).

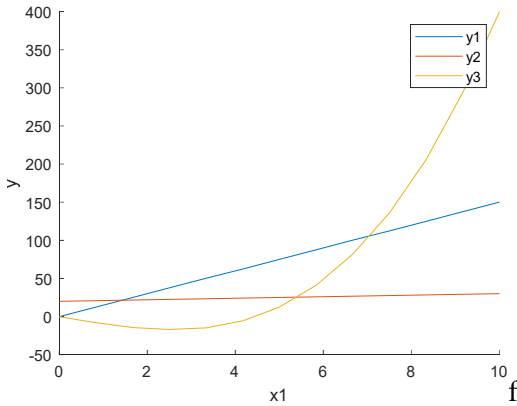
f1:



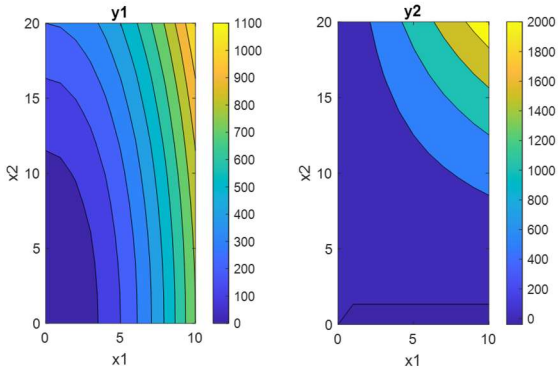
f2:



f3:



f4:



f5: