Objective

The objective of this programming challenge is to assess your comfort level with structuring and implementing a solution using object-oriented programming, and your ability to write clean, modular, scalable, and well commented code.

Task

Write a GUI that plots **arbitrary** functions f(x) with two parameters (e.g., f(x)=Asin(Bx), f(x)=Ax^B, or functions that don't have a simple mathematical expression). There should be an abstract base class that defines standard methods and properties (a standard API) for a two-parameter function in x that the GUI can handle - these methods should provide standard functionality, like returning a name or description of the function, the names/descriptions of the parameters, the value of the function for one or more values of x, and anything else you think will be important. Any particular function form is implemented as a class that inherits from the base class. The plotting GUI must have a way to receive a list (or the location of a list) of 2-parameter functions, and present the user with a way to select which function to plot from the list. Further, there should be, at the very minimum, UI elements for setting the value of the function parameters and the GUI should re-plot when the values are changed. Feel free to add any other UI elements that, in your opinion, would make the app easy to use.

Following the completion of the program, we will have a discussion in which you will explain to us how the program works and the design choices you made.

Requirements

- All source code, a list of dependencies required, and instructions on how to run the program should be emailed to Rafael (rafael.gomez@czbiohub.org) by the time and date specified in the email that contained these instructions.
- The program should be written in MATLAB or Python (no preference from our side).
    - If using Python, please use Python 3.6 or 3.7 and only use modules that can be installed via `pip`.
    - If using MATLAB, please only use official MATLAB toolboxes, and do NOT use the automatic code generation feature of GUIDE (using GUIDE for only laying out the figure is OK). Make sure you configure GUIDE so that it only generates the .fig file.
- **Please write the program in a way that you think is modular and scalable.** We should be able to create an infinite variety of 2-parameter functions in x that will work with the plotting GUI.
- There is no limitation on the number of lines of code, functions or files.
- All code should be well documented/commented.
- We are looking at how you think about the design of the program so that it's easy to use, has all the functionality somebody would reasonably expect, and it's modular and scalable.