Honor Code acknowledgment

This is an **individual exercise**, and your submission is subject to the [Mines Honor Code](#).

Type your name in this cell as an electronic signature before turning-in the exam to acknowledge the Honor Code. Your submission will not receive credit without your name here.

- type your name here

Introduction

Your goal is to convert a text file into a song whose play is triggered by the presense of a magnetic field. This midterm examination should take no more than 3-6 hours and has you design a simple curcuit and builds upon the Python concepts we have already practiced in class (up to but not including OOP). You may use course materials for reference and guidance.

Overview:

- Read in the song file (song.txt) that includes two colums of data for pitch and duration.
- When a magnetic field is detected (Reed Switch closed), send those notes in one at a time to the buzz function that will play music on your Piezo speaker and flash the LED to the music.
- Print a message to the screen and log the message with a timestamp to a logger.txt file (be creative, hint: look up f=open(fileName,'a') and f.write(logEntry)).
- When the program is terminated (stopped), generate and show a plot of the pitch values.

Learning objectives/concepts covered:

- Comments
- Variables
- Libraries
- Functions
- 2D array or list, slicing
- Loops and Conditionals
- File IO
- Plotting

Specific requirements

- Construct on a breadboard the following that are all included in your kit (NOTE: I will be running your code on my curcuit, so it is critial that you use EXACTLY the following pin Numbers for testing/grading):
    - Reed switch (setup and test with: h_ReedSwitch.ipynb) - GPIO PIN 27
    - Square magnet (only used for triggering the Reed Switch)
    - Piezo Speaker (setup and test with: h_Buzzer.ipynb) - GPIO PIN 25
    - LED - GPIO PIN 21
- Be sure to practice incremental coding to accomplish the following requirements:
    - Use variables where appropriate (e.g., no hard coding of pin numbers, filenames, booleans)
    - Use a a minimum one while loop, for loop, conditional (if/else)
    - Plot should have title, axis labels, and a legend (if appropriate)
- Create the following functions (at a minimum) to organize your code:
    - setupPins() - a function to setup the input/output pins
    - doFileIO(read=True) - a function to read in the file song.txt that returns an array/list if incoming boolean is true, otherwise, logs a message and a timestamp to an output file "logger.txt"
    - buzz(pitch, duration) - a function for playing the song on the Piezo Speaker and flashing the LED to the music (working stub provided)
    - plotData() - a function for plotting the data

To Do: Write your code in the cell below. We haven't given you any starter code for this one (except the partial buzz function), so you'll have to write everything from scratch. Be sure to put comments throughout your code so we can understand what it does. Even if you can't figure out how to write the code for something, a comment explaining what you wanted will get partial credit!