ECE 376 - Homework #8

Timer2 Interrupts - Due Monday, March 31st

Measuring Time with Timer2

Write a program to measure your reflex time with a resolution of 0.1ms using Timer2 interrupts.

- Press and release RB0 to start the game
- This geneates a random number from 3.0000 to 7.0000 seconds.
- Start decrementing time down to 0.0000 seconds using Timer2 interrupts
- When you get to 0.0000, turn on the lights on PORTA
- As soon as the lights turn on, press RB0 again

The time delay between when the lights turned on and you pressed RB0 is your reflex time.

1) Give a flow chart for this program

2) Write the corresponding C code

3) Validation: Collect data to verify your code works

- Timer2 is interrupting every 0.1ms
- The delay is random from 3 to 7 seconds
- The time from when the lights turn on and you press RB0 is recorded correctly

4) Student-t Test: Once your program works, collect 2+ measurements of your reflex time.

- From your data, compute the 90% confidence interval for your reflex time.

Generating Frequencies with Timer2

Turn your PIC board into an 8-key piano using Timer 2 interrupts.
- A note plays on a speaker as long as a button is held down.
- The frequency played depends upon the button:

RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0
A2	B2	C3	D3	E3	F3	G3	A3
110Hz	123.471 Hz	130.813 Hz	146.832 Hz	164.814 Hz	174.614 Hz	195.998 Hz	220 Hz

5) Give a flow chart for this program

6) Write the corresponding C code

7) Validation: Collect data to verify your code works

- Measure the frequency of each note
- Verify a note plays when a button is held down
- Verify the piano is silent when no buttons are pressed

8) What happens when you press two buttons at once?

- Determine by running your program
- Explain why this makes sense based upon how you wrote your code.