ECE 376 - Homework #8

Timer 2 Interrupts.   Due Monday, March 27th
Please email to jacob.glower@ndsu.edu, or submit as a hard copy, or submit on BlackBoard

Measuring Time to 1ms with Timer2 Interrupts

1) Write a routine for a count-down timer with a resolution of 1ms

- Time is measured to 1ms using Timer2 interrupts
- Each interrupt, pin RC0 is toggled (outputting a 500Hz square wave on RC0)
- Each interrupt (every 1ms), TIME is decremented to zero, stopping at zero
- TIME is displayed on the LCD display to 1ms: xx.xxxx
- When you press RB0, the time is reset to 5.000 seconds
- When you press RB1, the time is reset to 10.000 seconds
- When you press RB2, the time is reset to 15.000 seconds
- When you press RB3, the time is reset to 20.000 seconds

Check the accuracy of your stopwatch

- Measure the frequency on RC0 when sent to a speaker using a cell phone app (Frequency Counter works)

Generating Frequencies with Timer2 Interrupts

2) Write a routine which turns plays your PIC into a 1-string banjo using Timer2 interrupts

- Play note frequency of music note D2 (73.42Hz) on pin RC0 when button RB0 is pressed
- Check the accuracy of your music note using your cell phone (or whatever else you have on hand)
- note: You might need to use a coutner and toggle RC0 every 4th interrupt.

Reflex Timer

Problem 3-7) Build an embedded system which measures your reflex time:

- Start a given trial by pressing and releasing RB0
- Once pressed, the PIC waits between 3.00 and 7.00 seconds (random)
- After that time, all of the lights on PORTA turn on.
- When the lights on PORTA turn on, press RB0 again.
- The time delay from when the lights turn on and you press RB0 is then recorded and displyed on the LCD.

3) Write a flow-chart for this program

note: you should have two flow charts: one for the main routine, one for the interrupt

4) Write the corresponding C code

5) Collect data on your reaction time

6) (Population A): From your data, determine

- The 90% confidence interval for your reaction time, and
- The probability that your next trial will be less than 200ms
- The probability tht your average reaction time is less than 200ns

7) (Population B): Change something

- Have someone else take the test
- Take the test after drinking a pop
- etc.

Record a second set of data.

8) Determine the probability that

- A will have a lower reaction time than B in the next trial
- A has a lower average rection time than B