ECE 376 - Homework #9

INT, Timer 0/1/2/3 Interrupts - Due Monday, April 7th

Timer0 Interrupts

1) Write a C routine using Timer0 interrupts to measure time to 100ns. Using this routine, determine how long a the following operations in C take:

a) Press and release RB0 one time:

```
TRISB = 0xFF;

while(!RB0);
// start
while(RB0);
// end
```

b) Input code 1234

```
TRISB = 0xFF

// start
while(!RB1);  while(!RB1);
while(!RB2);  while(!RB2);
while(!RB3);  while(!RB3);
while(!RB4);  while(!RB4);
// end
```

c) The time it takes you to press and release RB0 ten times

```
TRISB = 0xFF;

for(i=0; i<10; i++) {            // start
   while(!RB0);
   while(RB0);
   }                             // end
```

Timer 0/1/2/3 interrupts

2) Write a program which uses interrupts to play four notes at the same time on PORTC

- Output Note Hz
- RC0 D#3 155.563Hz
- RC1 F#3 184.997Hz
- RC2 G#3 207.652Hz
- RC3 A#3 233.082Hz

Give the resulting C code and compiled code size

3) Measure the actual frequencies produced by your program

Hungry Hungry Hippo!

Write C a routine which has a 4-player game of Hungry-Hungry Hippo:

- The main routine constantly updates the score of the four players (A, B, C, D) and the time remaining (0.000 to 10.000 seconds)
- Interrupts update the scores of the four players
- Interrupts update the time remaining in the game with a resolution of 1ms (0.001 second)
- Pressing RB7 starts the game (scores reset to zero, time reset to 10.000 seconds)

4) Specify which interrupts you are going to use and the funciton of each interrupt.

5) Give the flow chart for your program

6) Give the C code and resulting compuiled code size

7) Validate your program

- Reset sets the scores to zero and time to 10.000 seconds
- Time is devremented using interrupts every 1ms
- Each player's score is incremented when his/her button is pressed (edge interrupts)

8) Demo

- In-person or with a video