ECE 376 - Homework #11

SCI Interrupts, z-Transforms - Due Monday, April 15th

SCI Interrupts

Write a program which

- Has the operator type in a four digit number on a keyboard
  - If you have a terminal emulator program which allows you to send keystrokes to the PIC
  - Otherwise, use some other input, such as a keypad, analog input, buttons RB0..RB7
- With a range from 100.0 to 999.9
- The PIC reads that number
  - SCI interrupts for a keyboard
  - Some other way if using the analog input, push buttons, etc
- The PIC displays the number on the LCD (100Hz to 999Hz), and
- The PIC outputs that frequency using Timer1 Compare interrupts

1) Give a flow chart for your program
   - Separate flow charts for each interrupt used
2) Write the corresponding C code
3) Verify your code works
   - Check the endpoints (100Hz and 999Hz)
   - Check a few points in between

z-Transforms

4) Assume X and Y are related by the following transfer function

$$Y = \left(\frac{2s+30}{(s^2+4s+20)} \right) X$$

a) What is the differential equation relating X and Y?

b) Find y(t) assuming

$$x(t) = 2 + 3\sin(4t)$$

5) Assume X and Y are related by the following transfer function

$$Y = \left(\frac{1.3(z+1)}{(z-0.8)(z-0.5)} \right) X$$

a) What is the difference equation relating X and Y?

b) Find y(t) assuming a sampling rate of T = 0.01 second

$$x(t) = 2 + 3\sin(4t)$$

c) Find y(t) assuming

$$x(t) = 2u(t)$$