

16.317: Microprocessor Systems Design I

Spring 2013

Homework 5

Due **Wednesday, 5/1/13**

Write a short PIC program to solve each of the following problems.

1. **(50 points)** Given a series of four LEDs (LED0-LED3) connected to bits 0-3 of Port A (which must be configured as outputs), write a program to turn on those LEDs using the sequence below. Assume that:

- The upper four bits of Port A must remain unchanged throughout the program.
- Writing a value of 1 to the appropriate bit will turn the corresponding LED on.
- One step should be executed every 10 ms.
- The sequence returns to Step 1 after Step 6.
- If the program reaches an error state (i.e., an invalid combination of LEDs are on), it should return to Step 1.

Step 1: Only LED1 on

Step 4: LED1 and LED3 both on

Step 2: LED0 and LED3 both on

Step 5: LED0 and LED2 both on

Step 3: Only LED2 on

Step 6: LED0, LED1, and LED3 on

2. **(50 points)** Configure Port A so that all bits are outputs, and configure Port C so that all bits are inputs. Repeatedly read a byte from Port C, doing the following operations based on the input values:

- If bit 0 is set, increment the working register.
- If bit 0 is clear and bit 1 is set, decrement the working register.
- If bits 0-1 are clear and bit 2 is set, clear the working register.
- If bits 0-2 are clear and bit 3 is set, output the current value of the working register to Port A.
- If bits 0-3 are clear and bit 4 is set, end the program.