

Name \_\_\_\_\_

CM \_\_\_\_\_ Section \_\_\_\_\_

**ME430 - Mechatronics**

Examination II

October 28th, 2009

<b>Problem</b>	<b>Circuit</b>	<b>Code</b>	<b>Demo</b>	<b>Total Score</b>	<b>Instructor Check Off</b>
1	/10	/20	/5	/ 35	
2	/10	/20	/5	/ 35	
3	/10	/25	/5	/ 40	
Total				/100	

Show all work for credit

You may use your computer, the class website, and any class notes.

You may not contact other humans.  
(If you can contact aliens, go for it.)

When you finish a problem call your instructor over to check you off on the front page.

**For all problems:**

The only code in the program should be the code which is necessary to accomplish the task—points will be deducted if there is extra stuff that we need to sort through. Before the end of the test, place the code in the ANGEL drop box.

**Problem 1 – ADC + Potentiometer Circuit**

Connect a potentiometer on the breadboard, such that one leg is connected to power, the other leg to ground, and the middle leg is connected to RE0. Connect the GND and +5V from the PICDEM board.

Set up a program that displays the RE0 value on the LCD, as a millivolt (mV) reading. The reading should display "RE0 = #### mV" on the top line of the LCD. For example, when the potentiometer is at the high extreme the display should read "RE0 = 5000 mV". Remove leading zeros for values below 1000 mV.

If you get the circuit connected and code working, call over the instructor to check off this part.

**Problem 2 – PWM + LED Circuit**

Connect an LED circuit using a ULN2003 Darlington. Use the PIC's second Pulse Width Modulation Pin ( PWM2) as the input to the Darlington. Write code to output a 10% duty cycle at a frequency of 10 Hz on pin PWM2.

If you get the circuit connected and code working, call over the instructor to check off this part.

**Problem 3 – Pushbutton Interrupts + Pushbutton Circuit**

Connect a pushbutton circuit to RB4. When the pushbutton is pressed, the RB4 input will go low. Set up a PORTB Interrupt on Change using RB4. Inside the Interrupt Service Routine (ISR) change the state of the RB0 LED that is on the PICDEM board. Since the PORTB Interrupt on Change interrupt occurs on both rising and falling edges, it will make RB0 toggle with the button is pressed AND when the button is released. When this is programmed correctly, it will look like the LED directly follows the button state. The main while loop should be blank.

If you get the circuit connected and code working, call over the instructor to check off this part.