ENGR 120 **Homework 5**

NOTE: Use non-engineering format for problems 1 through 4 and engineering format for problem 5 and 6. This is an individual assignment.

1. Wire a servo onto your breadboard as shown in the class notes from the previous class. Implement the program below. Write a paragraph describing how the digitalWrite(), delayMicroseconds(), and delay() functions work together to control servo motion. You may wire your servo to an I/O pin other than pin2 (it's your preference).

```
void setup() {
   pinMode(2, OUTPUT);
}
void loop() {
   int i;
   for (i=0; i<200; i++) {
      digitalWrite(2, HIGH);
      delayMicroseconds(1300);
      digitalWrite(2, LOW);
      delay(20);
   }
  delay(1000);
   for (i=0; i<400; i++) {
      digitalWrite(2, HIGH);
      delayMicroseconds(1700-i);
      digitalWrite(2, LOW);
      delay(20);
   }
  delay(1000);
}
```

2. Visit the following link:

http://www.arduino.cc/en/Reference/Servo

Enter the program below.

(a) Modify the program, allowing the number "1550" to range from 1300 to 1700 in increments of 50.

(b) Describe what happens as the argument of the writeMicroseconds() function is changed from 1300 to 1700.

```
#include <Servo.h>

Servo myservo1;

void setup() {
  myservo1.attach(2);        // assumes servo is on pin2
  myservo1.writeMicroseconds(1550);
}

void loop() {
}
```

3. Enter the program below.

(a) Describe how the program works, commenting on the attach() and writeMicroseconds() functions.

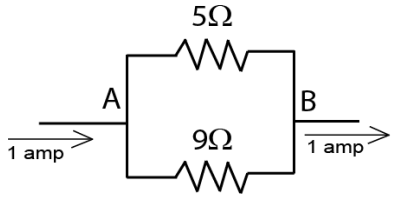
(b) What are the advantages of using the "Servo.h" library to control a servo compared to the method used for problem 1? HINT: Could you be doing something else during the 20ms of delay following the writeMicroseconds() command?

```
#include <Servo.h>

Servo myservo1;

void setup() {
  myservo1.attach(2);
}

void loop() {
  for (int i=0; i<=400; i++) {
    myservo1.writeMicroseconds(1300+i);
    delay(20);
  }
  delay(1000);
}
```

4. Review the PowerPoint presentation on soldering available on the class website, and complete the safety quiz. Turn the quiz in to your instructor in a separate stack of papers (don't fold the quiz in with this homework assignment).

5. Use the circuit below to answer the following questions:

(a) What is the voltage drop from point A to point B? 3.21V
(b) What is the equivalent resistance of the circuit? 3.21Ω
(c) What are the color codes for each of these resistors?
(d) What are the currents through the 5Ω and the 9Ω resistors? 0.64A through 5Ω and 0.36A through 9Ω
(e) Based on your answers in part (d), is KCL satisfied at point A? Does more current pass through the 5Ω or the 9Ω resistor? Does this make sense?



6. Consider the circuit below where V_1= 12V, R_1=220Ω, R_2=470Ω, R_3=220Ω, and R_4=100Ω.

(a) Compute the equivalent resistance for the entire circuit. 470Ω
(b) What current passes through R_1? 26 mA
(c) What is the voltage drop across R_1? 5.62 V
(d) What current passes through R_4? 26 mA
(e) What is the voltage drop across R_4? 2.55 V
(f) What is the voltage drop across R_2 and R_3? 3.83 V
(g) What current passes through R_2? 8.1 mA
(h) What current passes through R_3? 17 mA