**EET 240 Microcontroller I**

**Assignment: Math and Logic Programming**

**Introduction:** Manipulating data inside the microcontroller is done for example to:

1. Convert values for temperature readings.

2. Sound effects processing.

3. Allow the end-user to read the value in decimal format.

4. Make decisions based on a value.

The best way to understand all of these math and logic operations is to write a great deal of code and simulate the results so you can see how the values in the registers change and how the status register (SREG) impacts these values or how the program uses the SREG to make decisions.

1. Write a program to add the following numbers and save the result in R20: 0x25, 0x19, 0x12. Indicate the status of the C and H flags.

2. Write a program to multiply 77 x 34 in the AVR. Indicate the status of the C and H flags.

3. Write a program for each of the following and indicate the status of the V flag for each:

a) (+15) + (-12)

b) (+25H) + (+34H)

c) (-123) + (-127)

d) (-127) + (+127)

Extra Credit:

4. Write a program to convert the following packed BCD numbers to ASCII. Place the ASCII codes into R20 and R21.

a) 0x76

b)0x87

Simulate your work to verify it will operate correctly.

**Submission Details:**

1. Develop a history of how the SREG changes when each math and logic operation is executed. You can place your comments within the code or on a separate sheet typed up.

2. Develop your program and comment your code to reflect the processes being executed.

3. Zip up your work in a folder labeled Assignment4\_yourname and attach it to the submission box for Assignment 4.