UNC Charlotte, Department of Electrical and Computer Engineering
ECGR 4101/5101, Fall 2015, Homework #2 (20 points) – Version 1.1

Assignment should be turned in as a hardcopy during class. If you do not type, print NEATLY!!! Show your work for problems 2, 3, 5, 6, 7.

1. Write the C code to read the data on RX63N port D, bits 0 through 3 and write the data you just read to port D, bits 7 through 4 (bit 0 to 7, bit 1 to 6, etc.). Write a minimal amount of code. (1 point)

2. How many volts per ADC step are in a system with an ADC resolution of 10 bits and a reference voltage of 5.0 volts? (2 points)

3. An analog input has a voltage of 1.999. What will the ADC return if it has 12 bits of resolution and a reference voltage of 3.3 volts? Represent the value in hex. (2 points)

4. On Moodle, in the homework section for the class, is a short article (5 pages) on the Internet of Things. Read this paper. In a total of six to ten lines of correct English, write a single paragraph that answer these questions:

    a) What is the main goal of the author of this white paper? (What is he really trying to convey?) (3 points)

    b) Has the author provided enough technical information to be useful to an IOT device designer? Justify your answer. (3 points)

5. Consider the memory map and use of a microcontroller.

    a) What is the number of address bits needed to address any byte in a memory that contains 1,048,576 bytes? (1 point)

    b) Assume the memory from part (a) is actually a microcontroller's memory space. 64K is allocated at the top (starting at address 0) for RAM, followed by 32K of the special function registers, followed by 8K of EEPROM; 128K of flash is located all the way at the end of the memory space. Draw a picture of what this would look like. Identify all of the beginning and ending addresses of each space, include unused space. Express all addresses in Hex. (4 point).

6. Represent the decimal number 645.625 as a single precision floating point number (show the bits in binary). (2 points)

7. Represent the decimal number 17.28125 as a single precision floating point number (show the bits in binary). (2 points)