CPE 406/606 Homework Assignment #1   -   **due before 11:59 PM, February 6**

NOTE: Decoder Design due at the beginning of class (hand in paper) Thursday, January 25

NOTE: for **ALL** Homework and Project Assignments:

1. Specifications for assignments will be given in class and posted on the web page. These specifications must not be changed arbitrarily without mutual agreement between students and instructor. If you do not understand the specifications please contact the instructor and we can discuss them until they are clear. If you have specific questions please use email.

2. **Every homework assignment MUST have a cover page** which contains the following **sections**:
   - Your name, course number, HW number, and date
   - A brief description of the assignment and what you did.
   - A discussion of any problems you encountered.
   - A discussion of what you learned while doing the assignment.
   - A description of Completed Lab which includes written text, code listings, diagrams, and photographs.

3. All written material for homework assignments must be typewritten or printed from a word processor. Be sure to keep a copy of any work you submit for this course.

4. Homework is due on WebCampus before 11:59PM on the due date. If you cannot finish on time then it can be turned in late for at most 50% credit. (See course Syllabus for details.)

Homework Assignment #1

1.   The Intel 82C55 Programmable Peripheral Interface chip is designed to be connected to a microprocessor as a memory mapped I/O device which provides 3 additional 8-bit parallel (GPIO) ports for connecting to external devices. The ports are referred to as PA, PB, and PC in the data sheet.

a.   Design and build an Atmega2560 address decoder circuit for the 82C55 mapped as external DATA memory with a base (beginning) address of C800H using partial address (allow the 82C55 to foldback for 256 byte -> decode only address bits A15 through A8) decoding. Show the work for each step of your design including the memory map, memory address table, Boolean equation, and logic circuit diagram.

b.   Write code to initialize the 82C55 in mode 0, PA=output, PB=input, PC=output.

c.   Test reading and writing to the ports using an oscilloscope. To perform this test connect a relatively slow TTL square wave to one input bit of PB. Write an Arduino program which will continuously read the input from PB and write the result to output PA. Use the oscilloscope to display the desired bit from port PB and port PA on channels 1 and 2. Then repeat for input from PB to PC.