CSCE 236 Embedded Systems, Spring 2012
Homework 2

Started: Thursday, January 19, 2012
Due: Beginning of class Thursday, January 26, 2012

Instructions: This homework is an individual assignment, collaboration is not allowed. If you discuss any problems with others, please note this on the assignment as described in the syllabus. Also note any materials outside of lecture notes, course textbooks, and datasheets that you used. Answer all questions with **complete sentences** and describe your reasoning where appropriate for full credit. This homework is due on the date listed above before the start of class.

Name:

Problem 1 (5pts). *(To be completed at end of assignment) Approximately how much time did the total assignment take? Which problem took longest and how much time did it take?*

Problem 2. *Arduino Setup and Programming: For this problem, you should configure the Arduino programming software on your computer. Then program your Arduino with the sample Blink program. Once you have verified that you can compile and program your board with this sample program, modify it so that it blinks a short-short-long pattern of blinks and complete the following questions (make sure to read through these questions before starting).*

a) (5pts). *How did you specify the version of the Arduino you are using in the Arduino programming environment?*

b) (5pts). *How did you specify the serial port the Arduino is connected to in the software? What is the port name on your computer?*

c) (30pts). **Instructor sign off:** *Before the start of class on the due date, you must show the instructor or TA the functional code running on your Arduino for this part of the assignment. Look at the course website for posted office hours where you can be checked off.* **Plan ahead** *and email the instructor or TA to make alternative arrangements if none of these times work, but do not leave this until the last moment.*

Problem 3. *Digital I/O. Refer to the Arduino Uno R3 schematic posted on the course website for this question. For these questions, make sure to give* C *code where appropriate.*

a) (5 pts). *On the Arduino, how would you configure pin 6 on the output headers to be an output and how would you set it high? For this question, use the Arduino commands.*

b) (5 pts). *Which pin on the Atmel does this pin correspond to?*

c) (5 pts). *Which* registers *(there are two) control this pin and how would you set them on the Atmel to configure this pin as an output and set it high?*

d) (5 pts). *How would you set this pin low? Give both the Arduino-version and the Atmel register version.*

Problem 4. *Resistors*
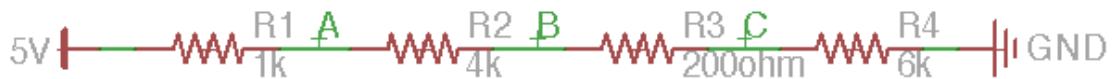
a) (5pts). *In the schematic above, what is the voltage at points A, B, and C?*

b) (5pts). *How much current is flowing through each of the resistors?*

c) (5pts). *What is the equivalent series resistance of all of these resistors? What is the equivalent resistance if they were all placed in parallel instead?*

Problem 5. *ATmega328 Datasheet*

a) (5pts). *What memory address is the* DDRC *register located at?*

b) (5pts). *How would you set (give the* C *code) the 4th and 5th bits in the* DDRC *register to the lowest two bits in the variable* var*? Make sure you set these bits at the same time.*

c) (5pts). *Which assembly instructions take the most clock cycles to complete? How many clock cycles do they take?*

d) (5pts). *What is the starting memory address for the Internal SRAM on the Atmel?*