Department of Electrical and Computing Engineering

UNIVERSITY OF CONNECTICUT

ECE 3411 Microprocessor Application Lab: Spring 2019

Lab Test 2

This two-page booklet contains one multi-part test problem. Answer the questions according to the instructions given.

You have **120 minutes (3:30 p.m. to 5:30 p.m.)** to program your AVR. You must upload the code by PDF/Word via Husky CT "Lab Test 1" by 5:30 p.m. The tasks in this test are also to be demonstrated to the instructor or TA from 5:00 p.m. – 6:00 p.m.

Answer questions sequentially to complete the tasks easily — you may want to skim all questions before starting. If you find a question ambiguous, be sure to write down any assumptions you make. For clarification, you may watch the TA demo video clip in HuskyCT.

Be neat and legible. If we can't understand your answer, we can't give you credit! Write your name in the space below. Write your initials at the bottom of each page.

THIS IS AN OPEN BOOK, OPEN NOTES TEST. YOU CAN USE YOUR LAPTOP.

Any form of communication with other students is considered **cheating** and will merit an F as final grade in the course.

Do not write in the boxes below

a(x/40)	b(x/30)	c(x/30)	Total 100(xx/100)

Name:

Student ID:

Q1. [100 points] Write C code to program the ATmega328PB XPlained mini kit and demonstrate that it implements the following tasks:

a. [40 points] Set up the ADC based temperature sensor (MCP9701) to display the ambient temperature in LCD.
   → First row of the LCD will display the temperature in Celsius
   → Second row will display in Fahrenheit.
   i.e. "T(C)=23.18" in first row and "T(F)=73.72" in second row.
   Formula for Celsius to Fahrenheit is as follows:

$$T(°\mathrm{F}) = 1.8T(°\mathrm{C}) + 32$$

b. [30 points] ADC values for temperature shall be sensed for every 60ms. Then, the temperature will be averaged after 300ms. LCD will be refreshed in every 300ms for averaged temperature.

c. [30 points] For ADC, use 64 as prescaler value. At the end of the ADC conversion, toggle the LED connected to PD4.