CONCORDIA UNIVERSITY
Software Engineering program

Take-Home QUIZ1: November 9, 2016 **Due November 16, 2016**

Submit this question paper with your answers embedded(!) after the questions. Send it to the Submission box provided on the moodle site. Please meet the deadline.

You may discuss this with anyone you wish, and consult anyone or any source to assist you in developing your answer. You must, however, write the program by yourself.

NOTE: The programs should be readable without the need to consult the manual.

Question 1. Teensy PWM

1a Write a program to control the frequency and intensity of flashing of two LEDs by commands received from the console. For this question, use bare metal to generate the PWM according to the instructions in the **ATMEGA 328** data sheet (manual) using timer1, output compare, and, if you wish, toggle mode on the OC1A and OC1B pins) You should show clearly the setting of the appropriate register values in your program. Control the frequency from 100 msec to 2 seconds.

1b Indicate clearly which pins are connected to the LEDs, and any hardware you may need, State clearly the design of the codes you send for selection of the LED, the intensity, and the frequency of flashing.

1c Explain your code briefly, within code documentation and a few external lines

1d Describe the software support and the procedures you need to execute. You do not need to demonstrate. This is entirely a paper exercise.

Question 2. Teensy Analog Read

2a In the same program, read an analog value from an appropriate pin at 1 second intervals, and send this value to the console. Use bare metal code. Read using the ADMUX, ADCSRA, ADCSRB, and ADC Data registers.

2b Explain your code briefly, within code documentation and a few external .lines

2c Vary the interval from your console

This program will not be demonstrated. I will mark the text only. Make sure that the program is well documented.