



Department of Electrical and Computing Engineering

UNIVERSITY OF CONNECTICUT

ECE 3411 Microprocessor Application Lab: Fall 2015

Question XII

There is 1 question in this quiz. There are 2 pages in this quiz booklet. Answer each question according to the instructions given.

You have **5 minutes** to answer the questions.

If you find a question ambiguous, be sure to write down any assumptions you make.

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 A CLOSED BOOK, CLOSED NOTES QUIZ.
PLEASE TURN YOUR NETWORK DEVICES OFF.**

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 box below

Total (xx/10)

Name:

Student ID:

1. The code measures voltage every $1ms$ through ADC in sleep mode. The user can also send characters to the MCU over UART. The program keeps track of the average and standard deviation of the measurements over the last $50ms$ using a circular buffer for storing voltage values.

```
void Task_ADCMeasure(void)
{
    int8_t flag = 1;
    while (flag !=0) { flag = (UCSR0A ^ (1<<TXC0)) & ((1<<RXC0) | (1<<TXC0)); }
    sleep_cpu();

    //statistics over last window samples
    volt_index = ((1.0*Ain)/1024.00)*5.00;    // 10 bit accuracy, AREF=5V
    volt = v_buffer[v_index];
    v_buffer[v_index] = volt_index;
    v_index++;
    v_index = (v_index % window);
    Sum1 = Sum1 - volt + volt_index;
    Sum2 = Sum2 - (volt*volt) + (volt_index * volt_index);

    // Computes Moving Average and Standard Deviation
}
```

a. Does the circular buffer approach shown in the code above produce accurate results for ADC noise measurement statistics? Explain your answer.

b. Can UART characters' reception be corrupted during the ADC operation shown above? Explain your answer.

End of Question

Please double check that you wrote your name on the front of the question.

Initials: