CPTR-480
Exam 2 planning

Our studies recently have focused on communication between the KL25Z microcontroller (MCU) and some other device, particularly sensors. Pay attention to understanding how MCU I/O functions work, how I/O to/from sensors works, and from a programming view how the sensors work. You should have studied the ADC, SPI, I2C, TPM sections of the KL25Z data sheets (ref [1] & [2]) while preparing various labs, so review those.

Review your code to recall what needs to be done to obtain the desired functionality. I don't expect you to write C code to answer questions but you need to know functionally what your C code is doing.

ADC
Review pages 152-156 in the textbook regarding sampling analog signals. Know how to figure out the voltage resolution of a converter. Also review pages 164-171 that summarizes operation of the ADC module in the KL25Z MCU. Note figures 6.18 & 6.19. How does Successive Approximation work? Recall the material presented in lecture. Know what needs to be done to initialize the ADC. Know the steps needed to initialize the ADC and how to read data from the ADC. In addition to reviewing the textbook material review the data sheet (i.e. chapter 28 of reference [2]). Know how to select an analog channel to convert. What format is data in when it is read from the ADC?

SPI
Understand the protocol used to send data from an SPI master to a slave using 4-wire mode. Also know how to use 3-wire mode to read a byte of data from the slave and also how to write a byte to the slave. How would two consecutive bytes of data be read with one command? I expect you can visualize or interpret a timing diagram of data being transferred using SPI. You should know the signal names involved. Know what is done to initialize a KL25Z SPI I/O module. Know how the data rate (bit rate) is established, what the clock source is, and what the maximum rate is for operating the MCU SPI clock. Textbook pages 221-226 discuss SPI. And of course ref [2].

I2C
We have only begun to investigate I2C which tends to be more complex than SPI while having similarities to 3-wire SPI.. Know the basics regarding I2C data transfer protocol as discussed in class and in the textbook pages 236-247.

Magnitometer
As an example slave SPI device, know basic info about it.

US-100
Review the code you wrote to operate the US-100 ultrasonic distance sensor. Know how distance measurement is initiated and how distance is represented with the signals from the US-100. Review how the TPM is used to measure pulse width.