EE 308 – Homework 6

For all problems below assume your are using a MCS12DP256 chip with a 24 MHz bus clock and a 8 MHz oscillator clock.

1. Write some code which will enable the ATD1 A/D converter, put it into 10-bit right-justified mode, and convert the analog inputs on pins PAD12 through PAD15 continuously.

2. Write some code which will enable the A/D converter ATD1, put it into 10-bit right-justified mode, and convert the analog input on pin PAD11 eight times, then stop. Add some code which will wait until the eight conversions are completed.

3. Add some code to the above problem which will average the eight values of the conversions of PAD11.

4. The ADXL325 is a MEMS 3-axis accelerometer from Analog Devices. It puts out three analog voltages which are linear functions of the accelerations along the three axes X, Y and Z. When connected to a 3 V power supply, the sensor puts out 1.5 V for an acceleration of 0 g, and has a slope of about 174 mV/g. The three outputs are connected to three A/D inputs of an MC9S12. The MC9S12 ATD is running in 10 bit mode. VRL is connected to +1 V, and VRH is connected to +2 V.

(a) What is the smallest acceleration change which can be measured?

(b) What is the acceleration when the A/D output is 0x007C?

5. Assume an ADXL325 is connected is connected to A/D ports PAD9, PAD10 and PAD11. Write a program to read the voltage from these three pins, and convert them to accelerations.

6. Suppose that the 7-bit address of an I2 C slave is B'1001011. What is the 8-bit hex value to write data to this slave? What is the 8-bit hex value to read data from this slave?

7. The Microchip MCP23016 provides 16 general purpose I/O lines over the IIC bus. Download the MCP23016 datasheet:

http://ww1.microchip.com/downloads/en/DeviceDoc/20090C.pdf

(a) How do you set the address for the MCP23016? What range of addresses can the chip have? How many chips can be used on a single IIC bus?

(b) How many registers does the chip have?