

EE 3171 HW5

Fall 2017

Due: 17 December 2017

No code for this assignment needs to be tested unless you feel it is necessary.

1. (3) Let the precision of a particular ADC be 14 bits. If the range of input voltages goes from 0–4 V, what is the resolution of this ADC?
2. (3) Consider that V_{in} to the ADC in Question 1 is 2.18 V. What is the result presented by the ADC (in hex)?
3. (3) Again using the ADC from Question 1, if the converted result from the ADC is 0x110B, what was the approximate input voltage?
4. (5) Consider that the same ADC is connected to a analog temperature sensor. When the temperature is 150°F, the sensor outputs 4 V. When the temperature is −150°F, the sensor outputs 0 V. If this sensor is in a refrigerator keeping your food at 39°F, what is the converted result presented by the ADC?
5. (3) What page in the Tiva Reference Manual contains the most compact reference between the 12 analog input channels and the the GPIO pin that shares that input?
6. (8) Write all of the TivaWare functions to appropriately configure a GPIO port for AIN7 to be used as an analog input.
7. (9) Write all of the TivaWare code to configure the Tiva thusly:
 - Use ADC 0
 - Use sequence number 1, step number 0
 - Use a processor trigger
 - Set to the lowest priority
 - Set to do absolute voltage on channel AIN7
 - Configure this to be the final step
 - Enable interrupts on completion of the conversion
8. (5) Consider that we have configured the ADC as described in the previous question. Write the ISR that will read the results of the conversions as described in the previous question and will put each value into successive slots of a 30-element array. When you run out of empty slots, wrap around to the beginning again. (That is, after `ADCResults[29]`, the next entry goes in `ADCResults[0]`.) You will need a `static` or global variable to keep track of where to put the current sample.

9. (2) Describe what it means when a serial link is running at 38400-8-O-1.
10. (5) Show the waveform that results when a device connects using the link in Question 9 and transmits the ASCII characters '&', 'P' and '0'.
11. (5) What are the values that would be placed into the **BRDI** and **BRDF** baud rate registers to configure the Tiva UART to a 56600 bps baud rate?
12. (8) Write the TivaWare functions to configure the UART to use a 28,800-8-N-1 serial link, enable the UART and enable receiver interrupts. Don't worry about global interrupts or registering the interrupt handler.