CPE 390: Microprocessor Systems

HW9
Due: 5/1/2018

1. What sampling rate and how many bits per sample are used on a regular audio CD? Why was this particular sampling rate chosen?

2. Suppose that there is a 10-bit A/D converter with $V_{RL} = 0.5V$ and $V_{RH} = 4.5V$, operating at a sampling rate of 15k samples/sec. Assuming that the converter generates unsigned digital values:

   - What would you expect the (hex) digital output to be when the converter samples an input equal to 3.4V?

   - What analog input voltage would correspond to an output of $1A0 ?

   - What is the maximum frequency component that may be present in the input signal if we are to avoid aliasing?

3. (a) Write a few instructions to configure the HCS12 AD0 converter to operate according to the following specifications (AD0 interrupt vector address is $FFD2):

   - E-clock frequency = 24 MHz

   - Analog input on channel AN1

   - Non-scan mode

   - ATD clock = 1MHz

   - Eight cycle second-stage sample time

   - Conversion externally triggered by rising edge on AN7

   - unsigned 8-bit result, right justified

   - Perform 3 conversions in a sequence

   - Enable fast flag clear, non-FIFO mode

   - Interrupt on sequence complete

   (b) How long will each conversion take?