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ECE 5780 -Lab 6 Post Lab Questions

1. **Consider a system where the DAC is updated every 4us (250 kHz) with a value from a 200- element wave table containing a single cycle of a waveform. What would be the frequency of the output wave?**

   To find the frequency of the output wave, we do the DAC update frequency / Wave Table Size. The DAC is updated every 4 microseconds (µs), which corresponds to an update frequency of 250 kHz. This means the DAC outputs a new value from the wave table 250,000 times per second. The wave table contains 200 elements, each representing a discrete point in a single cycle of the waveform. Therefore, to output a single complete cycle of the waveform, the DAC needs to go through all 200 elements of the wave table. So we do 250000 / 200 to get a frequency response of **1,250 Hz**. So the waveform represented by the 200-element wave table is output 1,250 times per second.

2. **Consider that the ADC in 12-bit mode divides the input voltage range (0-3V) into 4096 steps (where 0V is 0, and 3V is 4095). • What is the voltage/measurement resolution (how much does the voltage change per bit) of the ADC? • What would be the ADC output value (nearest integer) if the input voltage was 1.75V?**

   The voltage / measurement resolution of the ADC is **0.732 mV ≈ 0.7mV per step**. This can be found by Voltage Range / Number of Steps -> 3/4096 which is 0.732mV. Then we plug the resolution to the ADC output, This is calculated by input voltage / Resolution. Which is 1.75/ 0.732mV to get us a value of **2,389** for the ADC output value.

Here is the screenshot of the Waveform for the second checkoff: