ME 333 Quiz 6

IO, Counters/Timers, OC, Analog Input

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Quiz 6

1) **Use the IO SFRs to make pin CN14 an input and enable the pullup resistor:**

   ```
   // Make CN14 (RD5) input
   TRISDbits.TRISD5 = 1;

   // Enable pull-up resistor
   CNPUEbits.CNPUE14 = 1;
   ```

2) **List two differences between the CoreTimer and Timer2:**

   (a) Timer2 is a peripheral rather than part of the MIPS32 CPU

   (b) Timer2 can increment once every N PBCLK cycles rather than every two SYSCLK cycles

3) **Timer1 has been setup to count external pulses, and can have a prescaler of N = 1, 8, 64, or 256. What is the largest number of input pulses that can be counted before the timer rolls over, and what prescaler N and period register PR1 are used to count to this number?**

   16,777,216 — To count this number of pulses, a prescaler N = 256 and period register PR1 = 65535 are used.

4) **OC4 and Timer2 are used to create 2000 Hz PWM with 20% duty cycle.**

   a. **Assuming you use a prescaler of N = 2 and a PBCLK of 80 MHz, what is the value of PR2?**
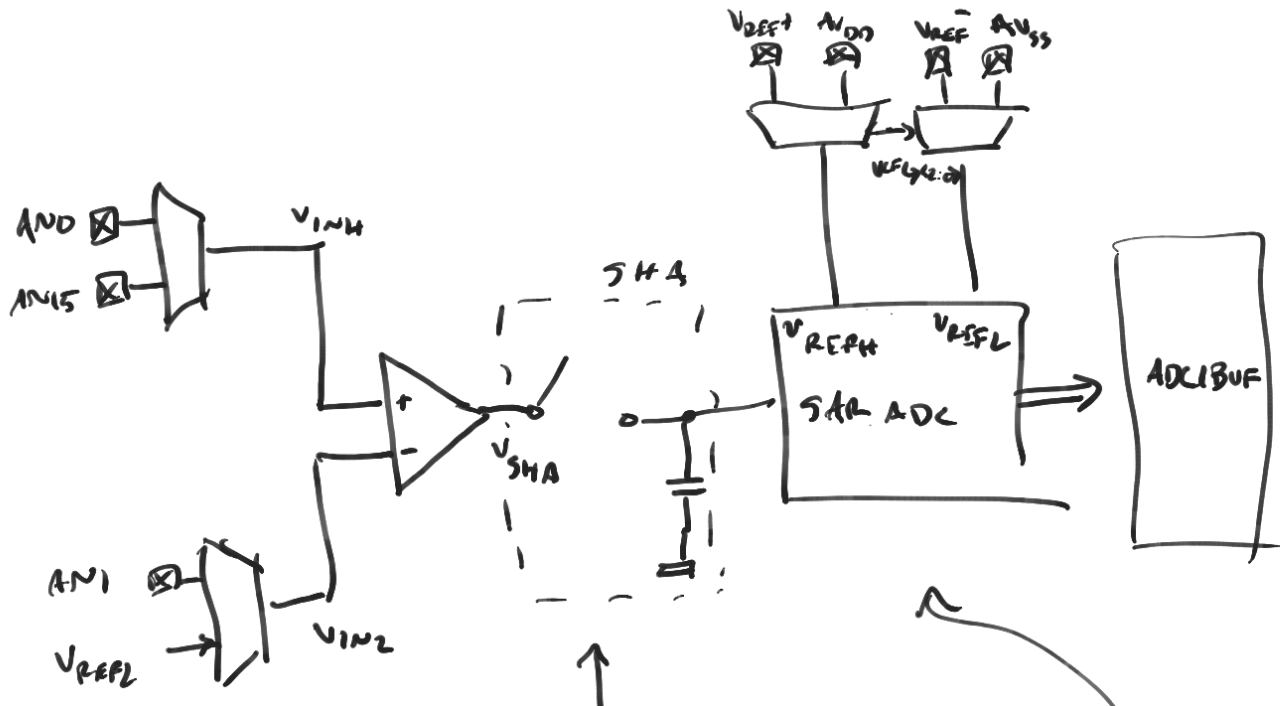
   $$40000 = (PR2 + 1) * 2$$

   $$PR2 = 19999$$

   b. **What is the value of OC4RS?**

   $$\frac{OC4RS}{19999 + 1} * 100\% = 20\%$$

   $$OC4RS = 4000$$

5) Describe and draw a picture of the two steps in the process of reading an analog input.

Sampling Stage:
- Capacitor charges/discharges to hold V_{SHA} ($V_{INH} - V_{INL}$)
- SHA disconnected from inputs @ end of stage

Conversion Stage:
- SAR converts V_{SHA} to 10-bit result depending on V_{REFL} and V_{REFH}
  ($1024 \times V_{SHA} / (V_{REFH} - V_{REFL})$)
- 10-bit conversion written to buffer (ADC1BUF)