ME333 – Homework 5 – Yael Ben Shalom

Chapter 7, Exercise 1:

if an input pin is not connected to anything, we cannot be certain what the input will read → FALSE!

Chapter 7, Exercise 2:

a) Pin 2 would most likely have an external pull-up resistor.

A reasonable range of resistances to use would be 500Ω-900Ω – pin 2 gets 5V, and can get current of between 50 μA to 10mA, so according to Ohm's law (R = V/I), the range is 500Ω-100000Ω. Although we shouldn't input more than 9V to avoid over-heating, so the maximum resistor is 900Ω.

b)

```
AD1PCFG = 0x0000001E;
TRISB = 0x0000FFF9;
ODCB = 0x00000004;
CNPUE = 0x00000040;
CNCON = 0x00008000;
CNEN = 0x00000020;
```

Chapter 8, Exercise 1:

the four-digit hex values for T3CON and PR3 so that Timer3 is enabled, has a 1:64 prescaler, and rolls over (generates an interrupt) every 16 ms, when PBCLK is running at 80 MHz are:

The time between rollovers is T = (P + 1) * N * 12.5 ns, where P = period match, N = prescaler value.

- T3CON = 0x8060;
- PR3 = 0x4E1F;

Chapter 9, Exercise 1:

The formula for the maximum f_a given that we require n bits of resolution in our DC analog voltage outputs, assuming constraints $f_{PWM} \geq 100f_c$ and $f_c \geq 10f_a$ and PBCLK is 80 MHz:

$$f_{pwm} = 80 / 2^n \text{ KHz}$$

The formula for RC in terms of n:

$$f_c = 1 / 2\pi RC \geq 10f_a$$

$$RC \leq 1 / 20\pi f_a$$

$$RC = 2^n / 20\pi f_a$$

Chapter 10, Exercise 1:

Configure the ADC for manual sampling and automatic conversion. Set Tad and the sampling time as short as possible while still meeting the minimum constraints:

AD1CON1bits.SRCC = 0b111; // Auto conversion

AD1CON1bits.ASAM = 0; // Manual sampling

Tad = 6*Tpb = 75ns // Tpb is 12.5ns for the NU32, to meet the 65ns specification, the smallest value we can choose is Tad = 75ns.

Tsamp = 2*Tad = 150ns

AD1CON1bits.ADCS = 0x02; // Tad = 2 × Tpb × (AD1CON3bits.ADCS + 1)

Chapter 10, Exercise 2:

The code for this exercise attached in '/code/Ch10Q2' folder.