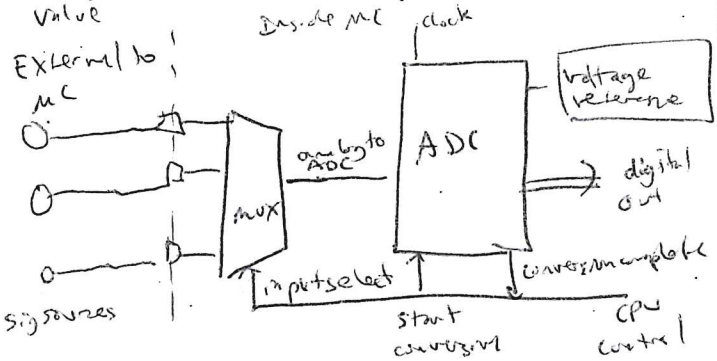
NAME MSD-8 COURSE ENGR 4020

DATE

LESSON Analog In 1 - PAGE 1 of 1

The ADC

- An ADC converts an analog signal to a digital one that is proportional to the value



- digital output D

$$D = \frac{V_i}{V_r} \times 2^n$$

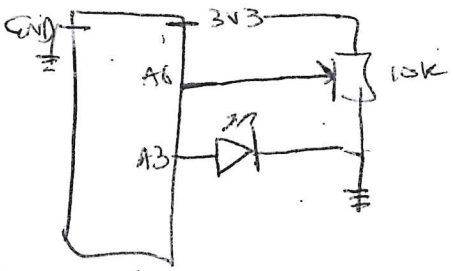
V_i: input voltage, V_r reference voltage
n: number of bits

- resolution = $\frac{V_r}{2^n}$
- sampling frequency
  - to convert from analog to digital, we sample at discrete time steps

- maximum frequency that can be measured accurately is $\frac{F_s}{2}$
  - where F_s = sampling frequency
  - called Nyquist sampling criterion
  - if frequencies higher than $\frac{F_s}{2}$ are represented in signal, they will alias, or appear as other, incorrect frequencies
  - typically use a low pass anti-aliasing filter to below $F_s/2$

Analog IN with mbed

AnalogIn	AnalogIn object on specific pin
read	read input voltage, specified as a float in the range of 0-1
read_u16	read input voltage in range (0x0 - 0xFFFF) ("unsigned short")



DEx: See program

DEx: use pot to set pwm duty cycle

Pwm period: 10 ms
duty cycle is from A6

output on pin D9
- wait 0.1 before continuing

DEx: frequency control
See program

Data monitoring
- Teraterm or Coolterm
  - serial pc (USBTX, USBRX)
  - pc.printf
  - see example code

Averaging
- average noisy filter, see example code