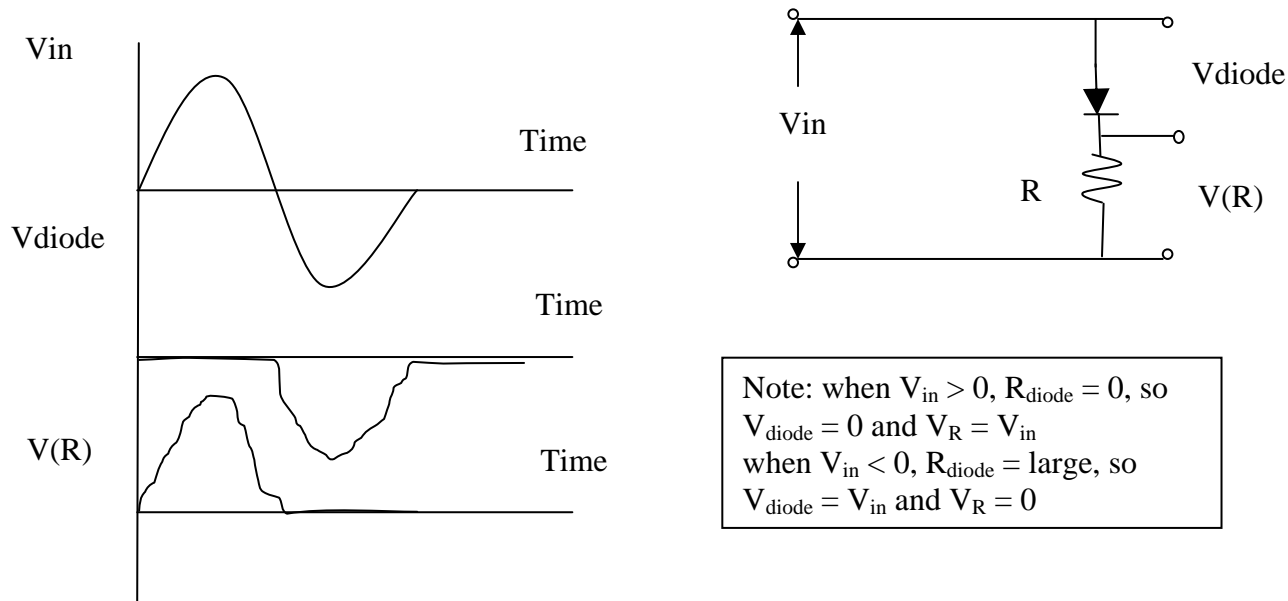


CHEMISTRY 133
Quiz 2 – Solutions

1. Assuming the diode in the figure to the right behaves ideally and V_{in} is as shown to the left, sketch V_R and V_{diode} as a function of time



Note: when $V_{in} > 0$, $R_{diode} = 0$, so $V_{diode} = 0$ and $V_R = V_{in}$
 when $V_{in} < 0$, $R_{diode} = \text{large}$, so $V_{diode} = V_{in}$ and $V_R = 0$

2. Convert the following decimal numbers to binary:

a) 29

$$29 = 16 + 8 + 4 + 1$$

so **11101**

b) 63

$$63 \text{ is one less than } 64 \text{ so } = 32 + 16 + 8 + 4 + 2 + 1$$

so **111111**

3. A 10 bit analog to digital convertor allows input voltages from -500 mV to +500 mV. What is the average error in the signal read (in mV) following digitization?

average error = $1/2(\text{bin } V)$ where $\text{bin } V = \text{range}/2^n$ with $n = \# \text{ bits}$

$$\text{average error} = 0.5 \{ [500 \text{ mV} - (-500 \text{ mV})] / (2^{10}) \} = 0.5 [(1000 \text{ mV}) / (1024)] = \mathbf{0.49 \text{ mV}}$$