Homework 1

VE311 - Electronic Circuits Fall 2021

∗ Name: Huang Yucheng ID: 519021910885

1.1

We can see here in the graph, the current increases suddenly when the V_{in} is about 0.35 V and there is an obvious slope change on the function curve. Therefore, the turn-on voltage is about 0.35 V.

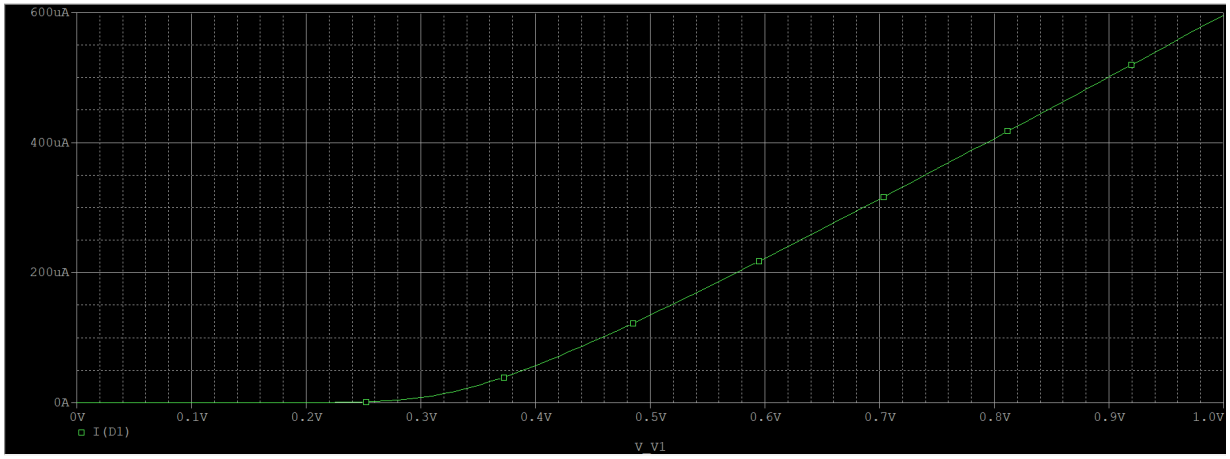

Figure 1: turn-on voltage with DC sweep

1.2

The plot is here. Explicitly, when V_{in} is less than 0.35 V, the current is zero because the diode is off.

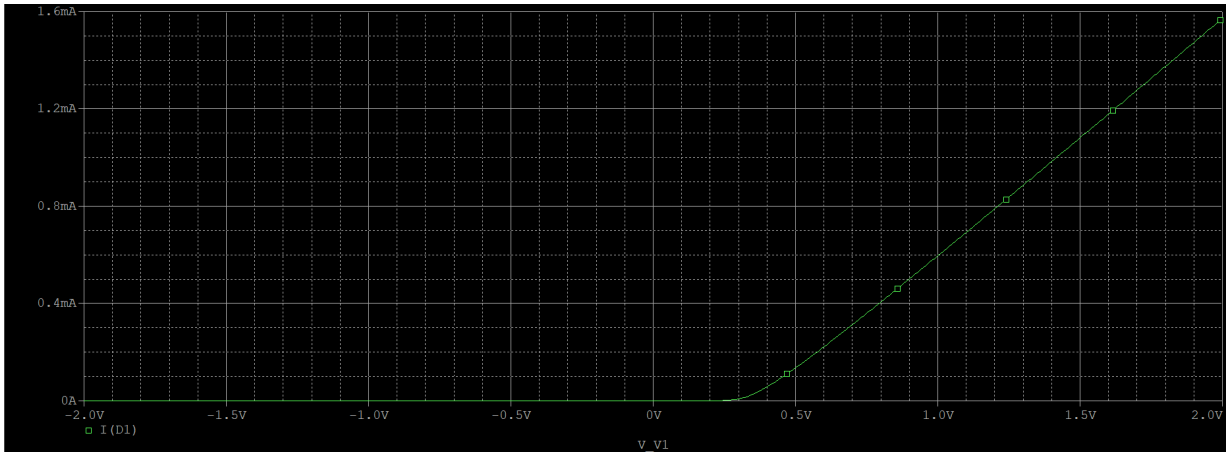

Figure 2: V_{in} vs I_{D}

When V_{in} is greater than 0.35 V, the diode is on. We can think of it as a voltage source, its voltage is about 0.35 volts.

Therefore, the current is:

$$I_D = \frac{V_{in} - V_{on}}{R} = \frac{V_{in} - 0.35}{1k}$$

Obviously, this is a proportional relationship. Therefore, it is a linear increase.

1.3

The plot is here. When V_{in} is less than 0.35 V, the current is zero. Therefore, $V_{\text{out}} = 0$

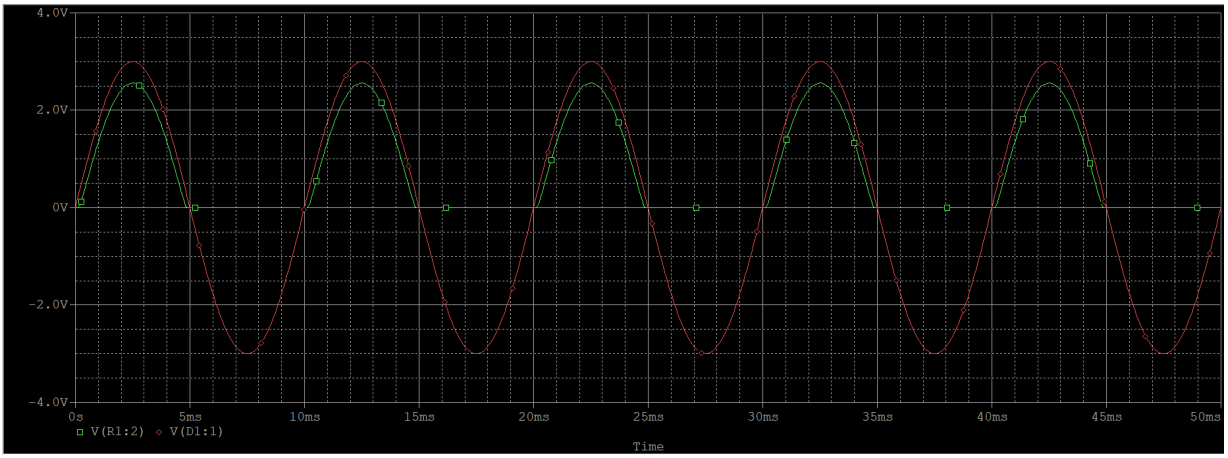

Figure 3: problem C

When V_{in} is greater than 0.35 V, the diode on, and equals an voltage source 0.35 V in the opposite direction. We can find that when V_{out} is at its maximum value, the gap between it and V_{in} is about V_{on} $0.35V$

Therefore, $V_{\text{out}} = V_{\text{in}} - V_{\text{on}}$

1.4

The plot is here.

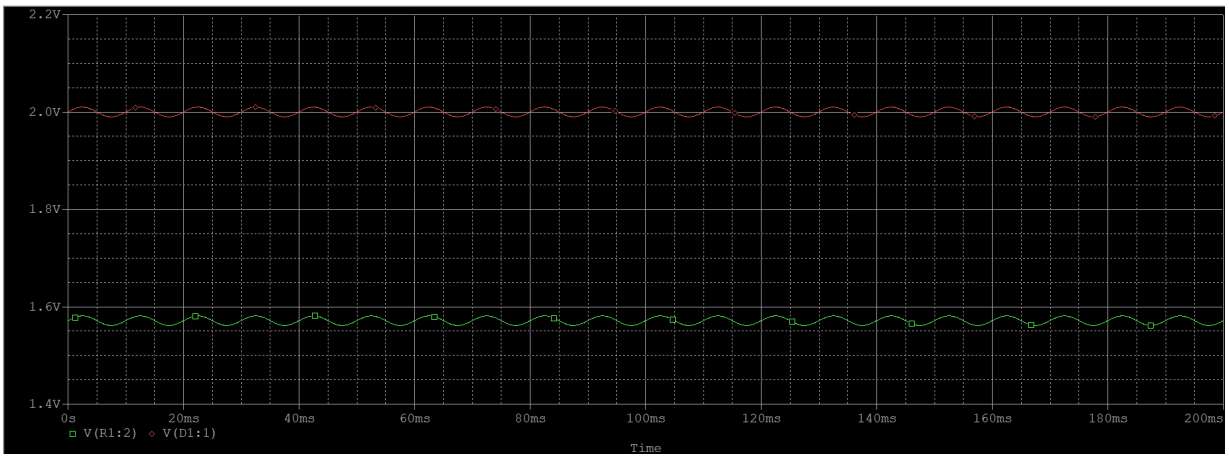

Figure 4: Problem D

V_{in} is more than 0.35 V, the diode is on and is equal to an voltage source 0.35 V. Because the amplitude of 0.01 is much smaller than 2, the difference between them is about 0.35 V. Therefore, $V_{\text{out}} = V_{\text{in}} - V_{\text{on}}$