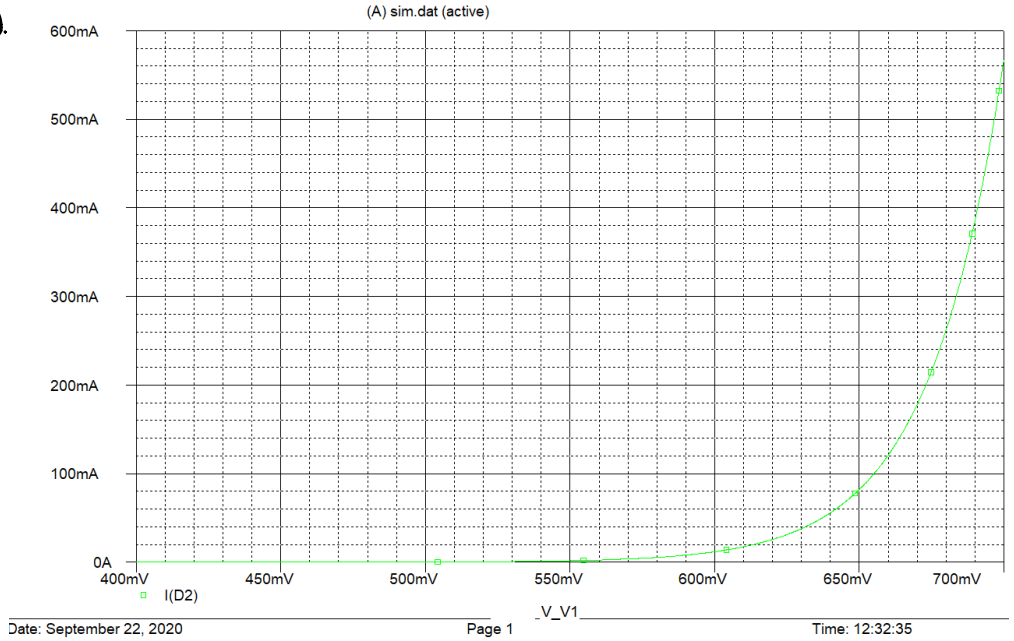
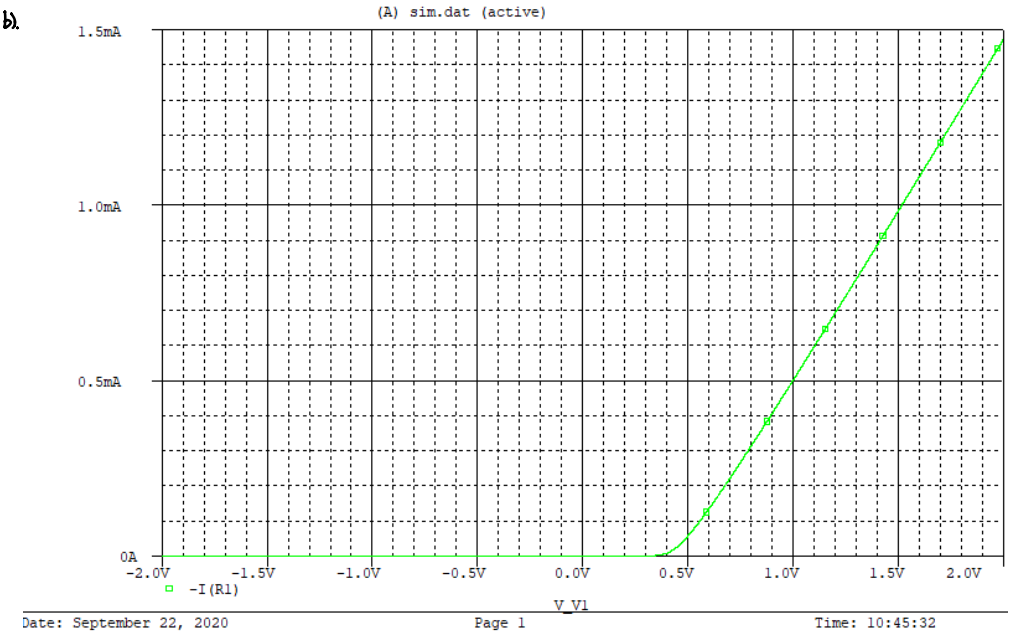
VE311 Hw1 周维端 5180219110 39

(a).

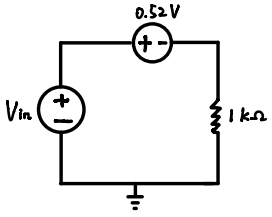


From the plot, we can get that $V_{on} = 0.53\ V$

(b).



We can consider the circuit as follows when the diode is turned on.

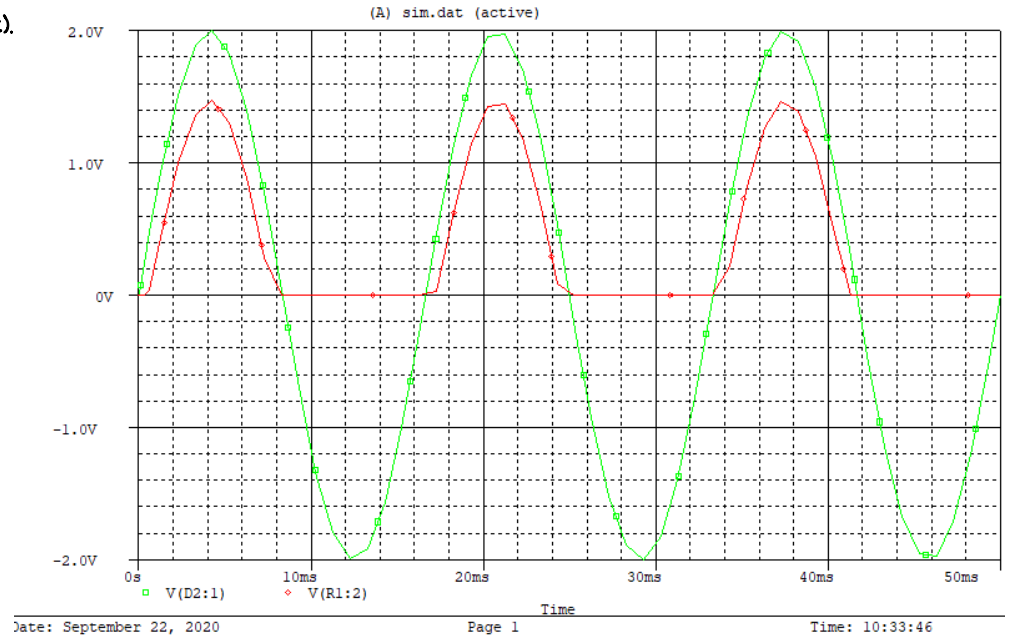


$V_D = V_{on} = 0.53V$

$I_D = \frac{V_{in} - V_D}{R} = \frac{V_{in} - 0.53}{1000} = \frac{1}{1000} V_{in} - 5.3 \times 10^{-4}$ (A)

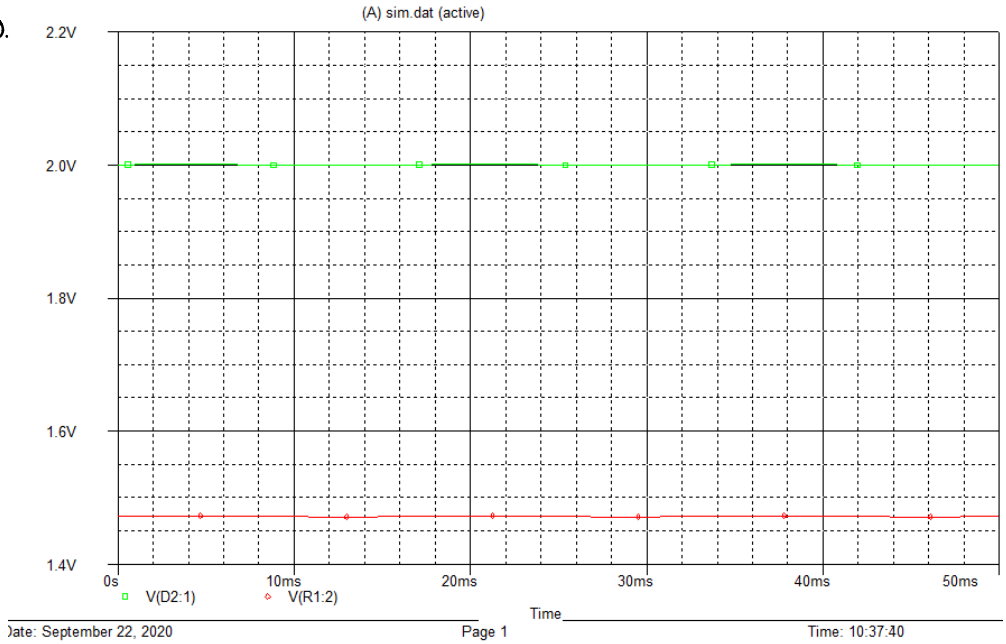
Therefore, it is linear increase.

(c).



When $V_{in} < V_{on}$, there is almost no current flowing through the circuit, then we can regard $V_{out} = 0$.
When $V_{in} > V_{on}$, the voltage on the diode is V_{on}, then we can know that $V_{out} = V_{in} - V_{on}$

(d).



In this case V_{in} is always larger than V_{on}, then we have $V_{out} = V_{in} - V_d = V_{in} - V_{on.} = 1.47 + 0.001\sin(120\pi t)$ (V).
Since $0.001 \ll 2$ and $0.001 \ll 1.47$, both V_{in} and V_{out} looks like a straight line.