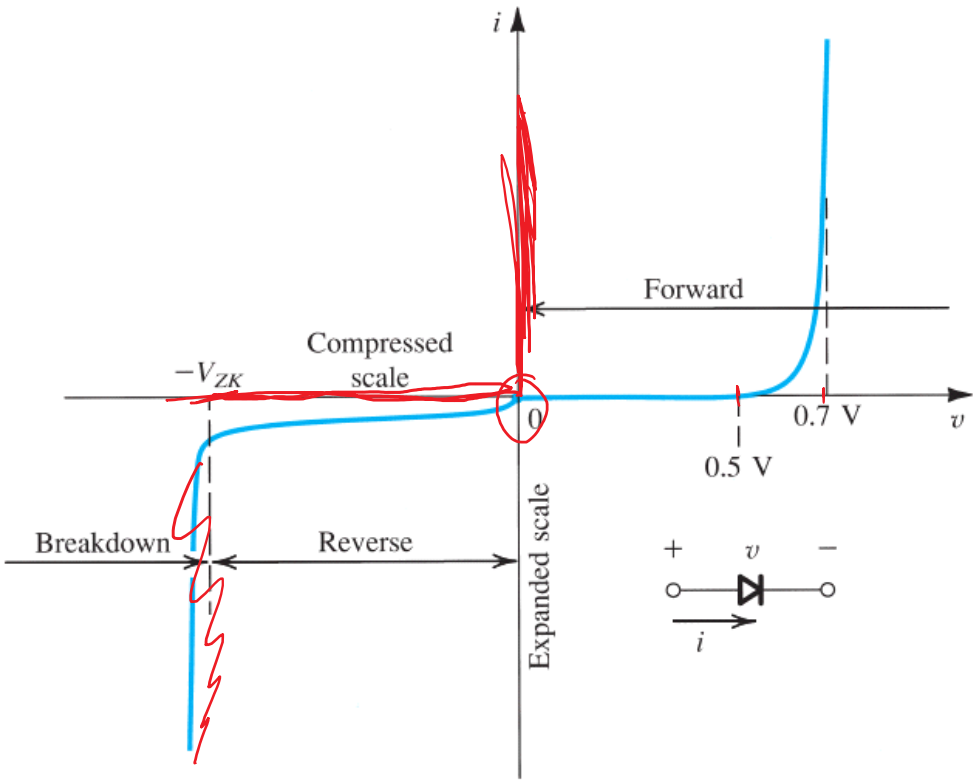
Reading

Adel S. Sedra and Kenneth C. Smith, **Microelectronic Circuits** 7th Edition, *Oxford University Press*, 2014.

- Chapter 4.1, 4.3, 4.4

Recap-1



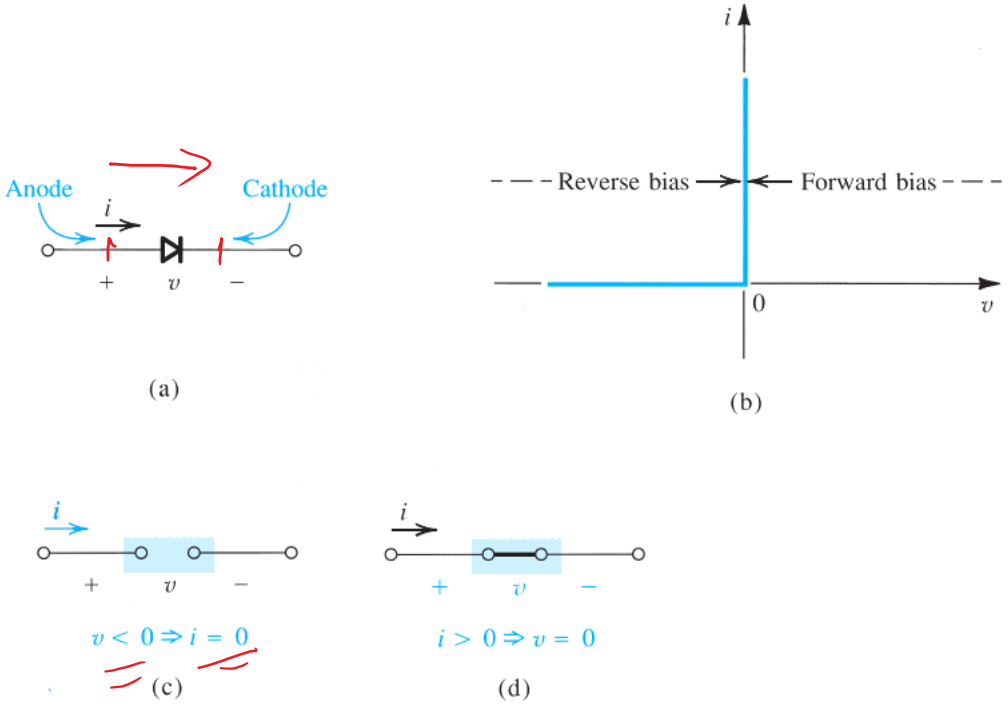
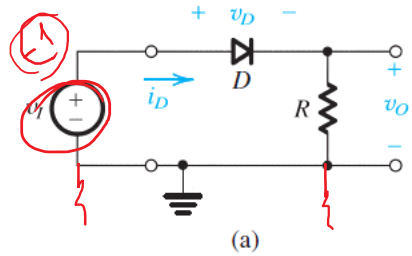
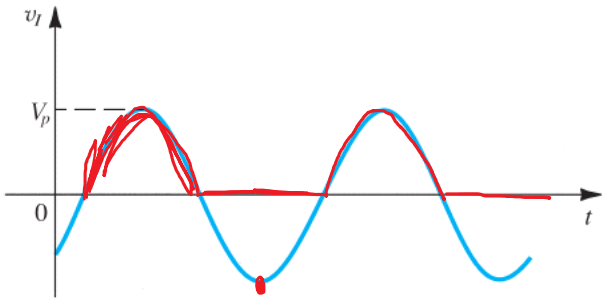


Figure 4.1 The ideal diode: **(a)** diode circuit symbol; **(b)** i–v characteristic; **(c)** equivalent circuit in the reverse direction; **(d)** equivalent circuit in the forward direction.

Recap-2



(a)



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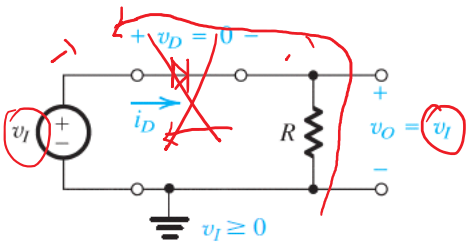
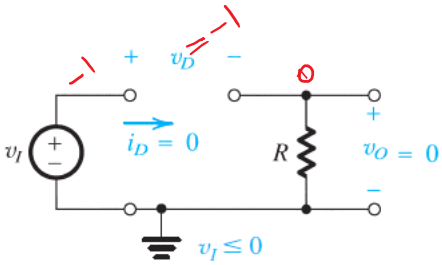


(c)



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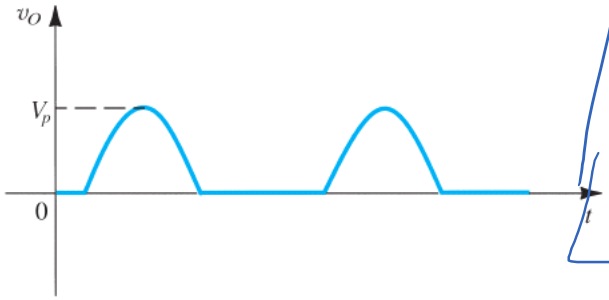

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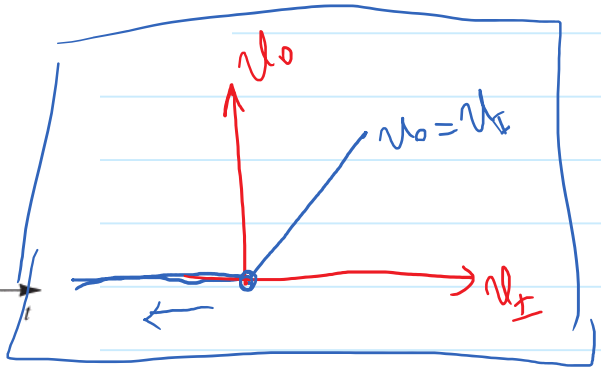
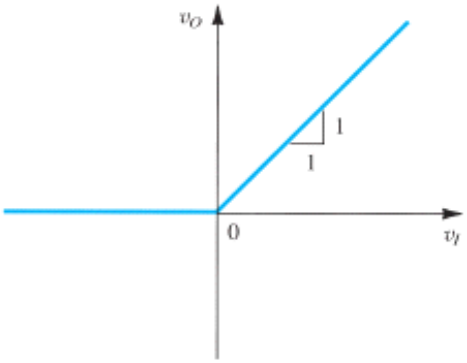
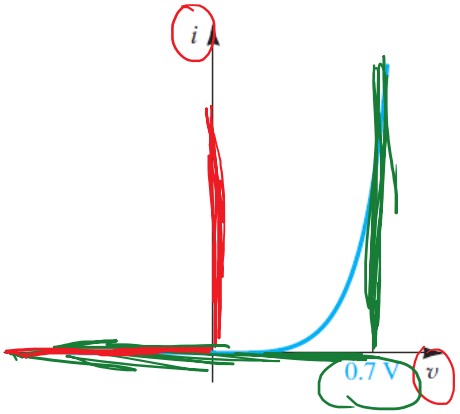
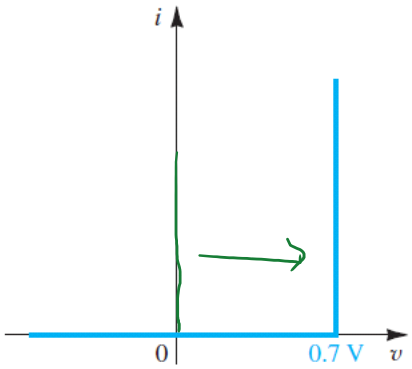




Constant Voltage Drop Model



(a)



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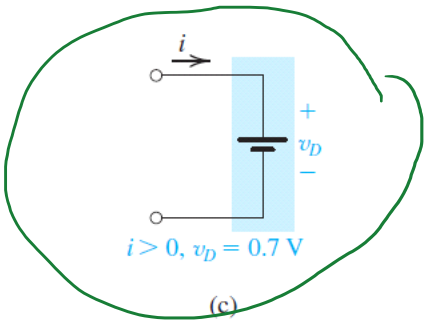

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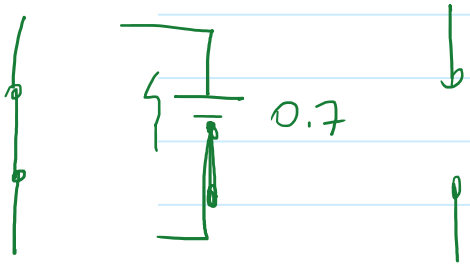
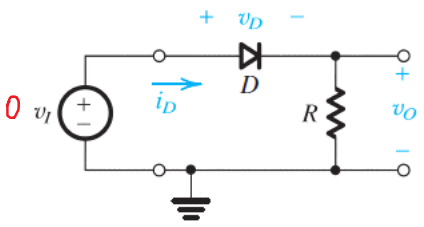
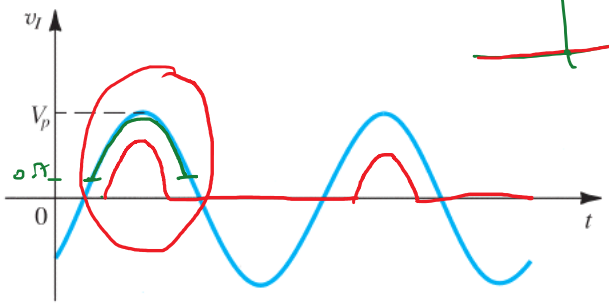


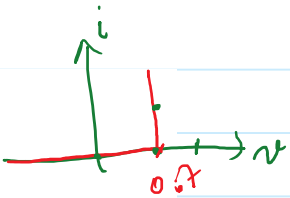
Example

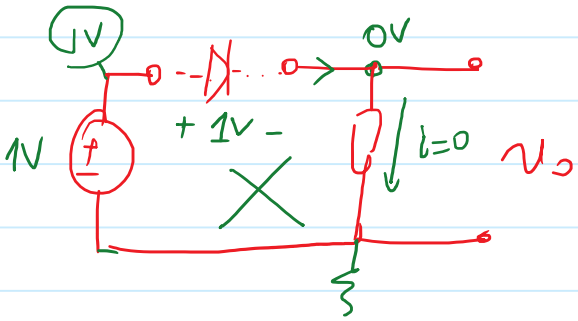

+ v_D −
D
i_D
v_I
R
+
v_O
−

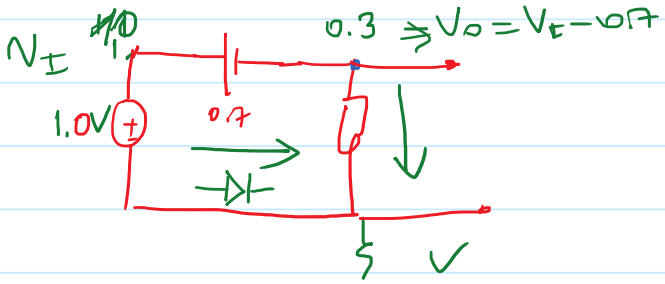
(a)

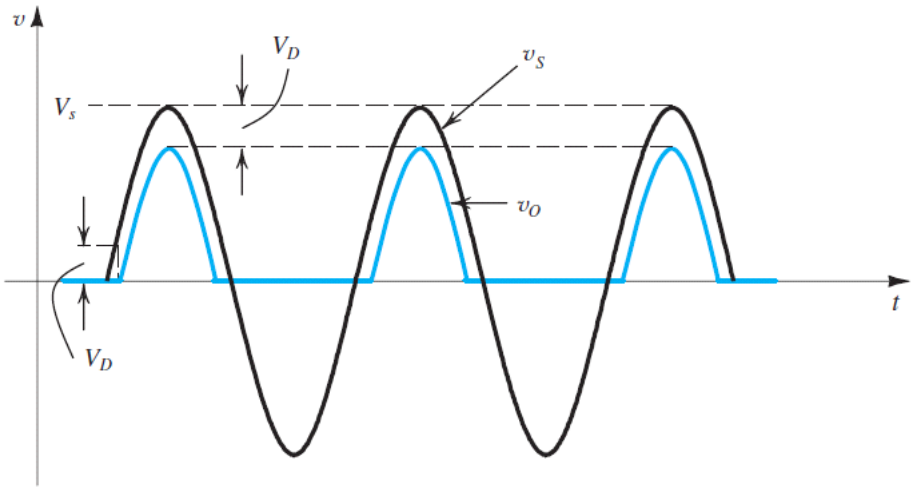

v_I
V_p
0
t

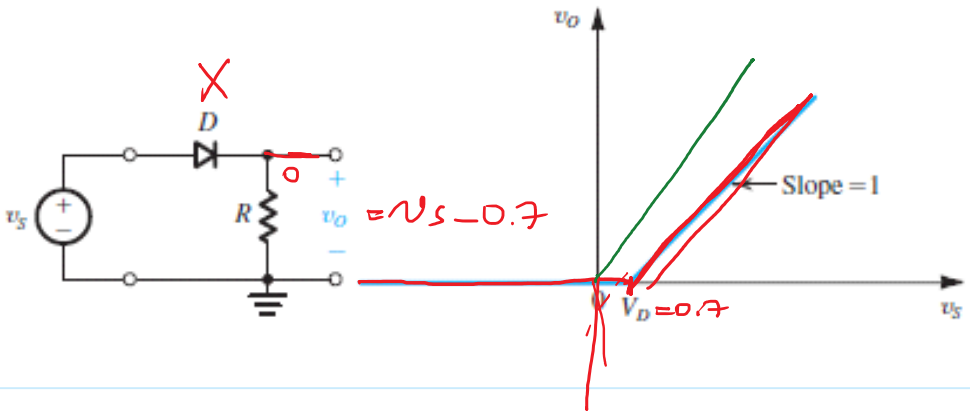
(b)


i
v
0.7

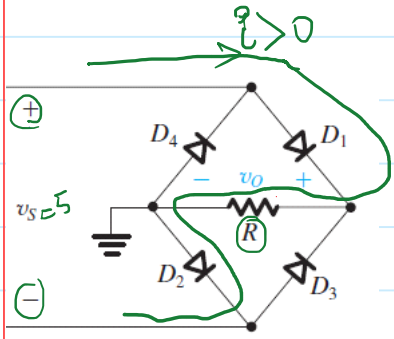

1V
0V
0
+ 1V −
1V
i=0
v_o

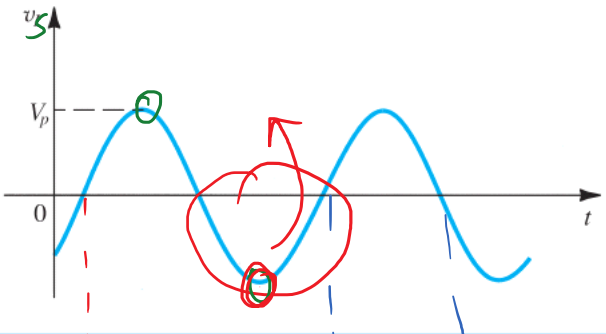

V_I
1.0V
0.7
0.3 ⇒ $V_o = V_I - 0.7$
V

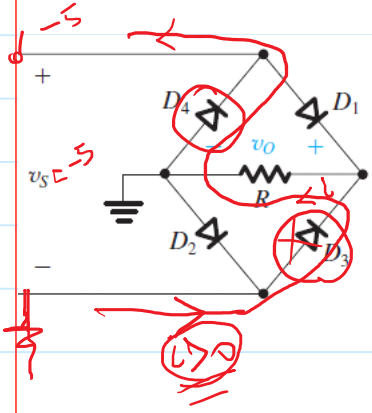

v
V_D
v_S
V_s
v_O
t
V_D

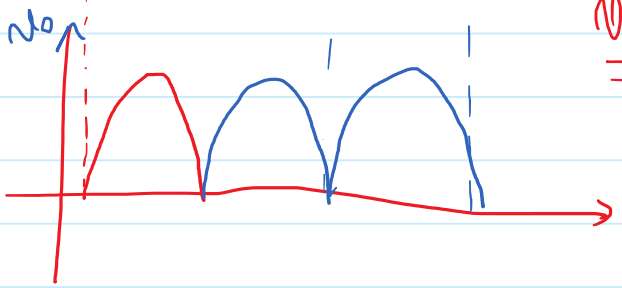

X
D
0
+
v_S
R
v_O
−
$= v_S - 0.7$
v_O
Slope = 1
$V_D = 0.7$
v_S

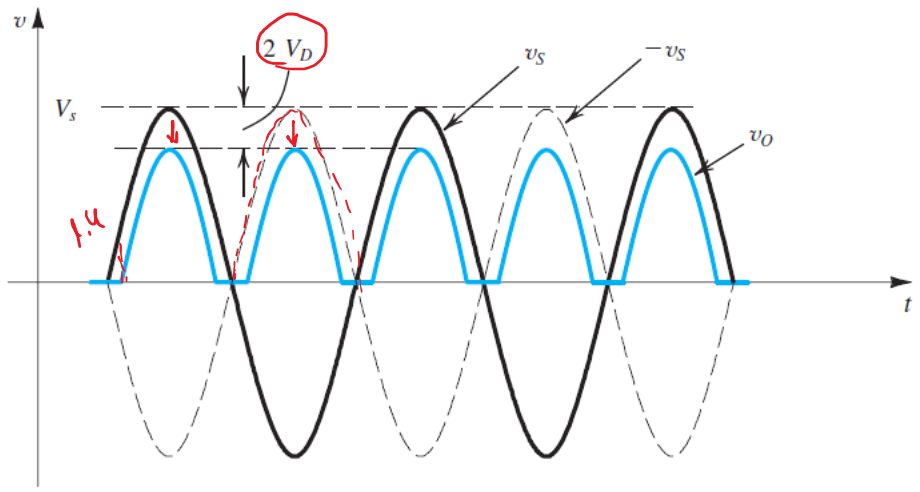
Example



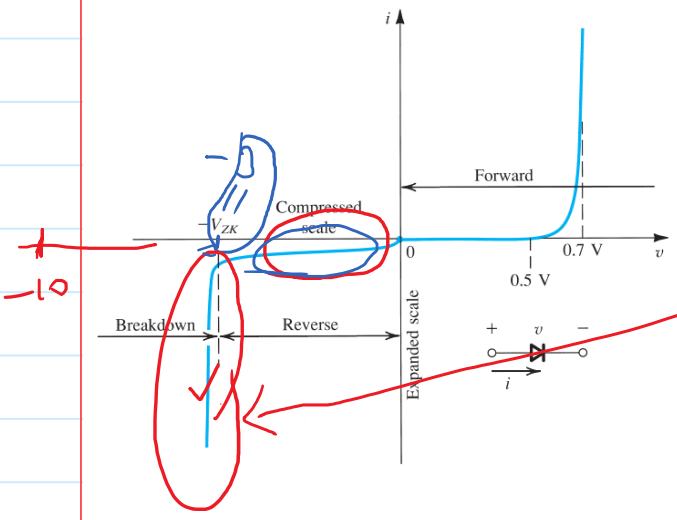


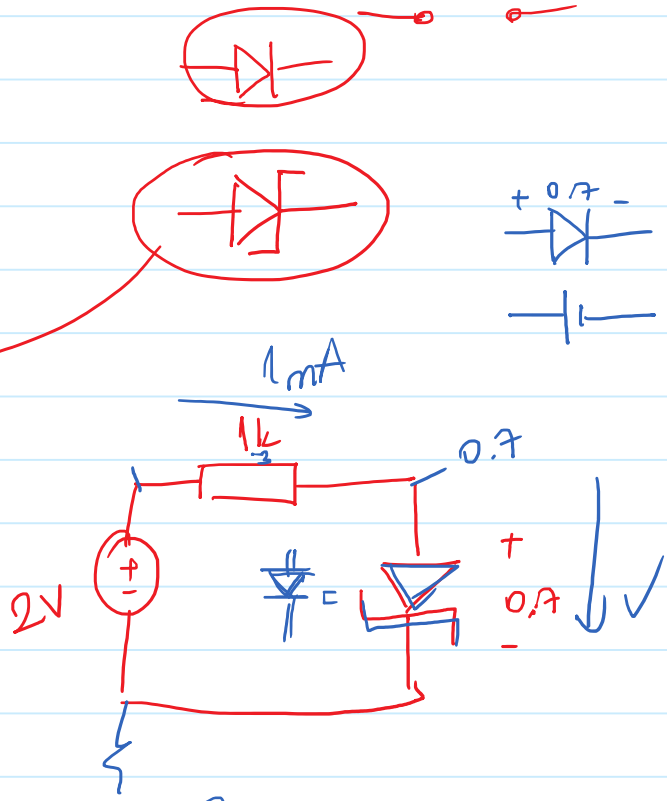




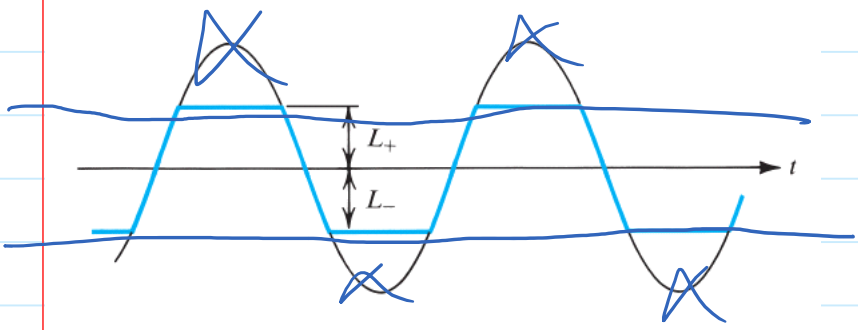


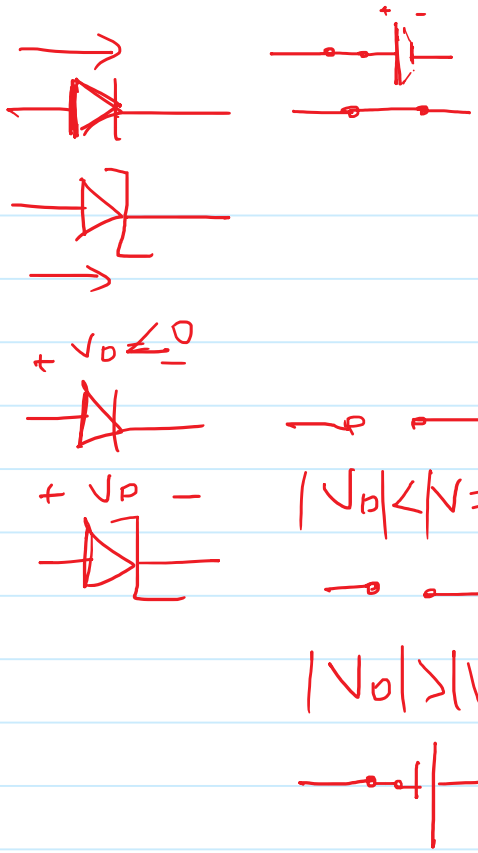
Reverse Breakdown - Zener Diodes



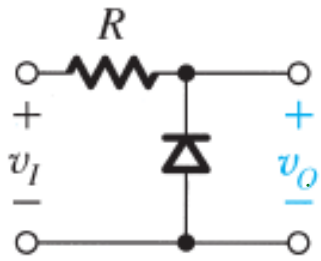


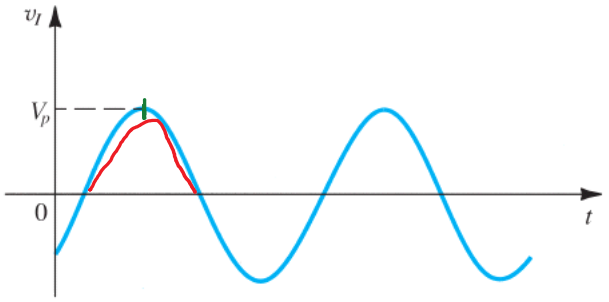
Limiter Circuits

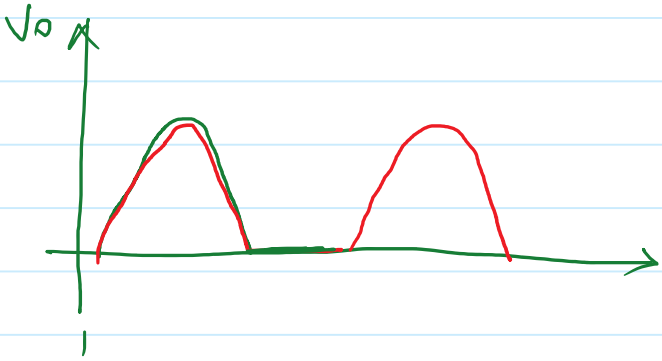


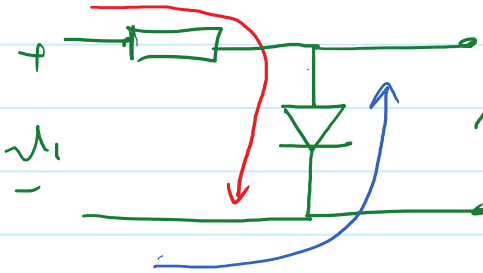


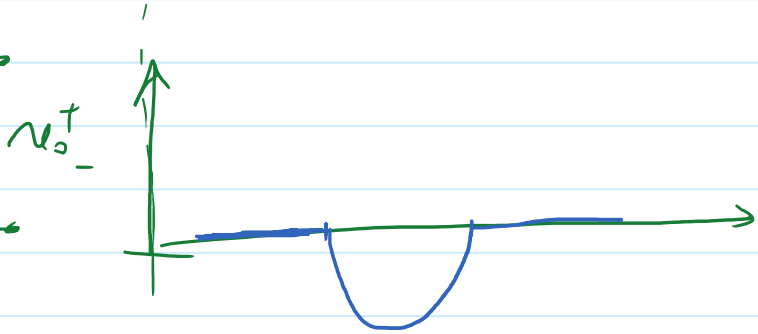
Example

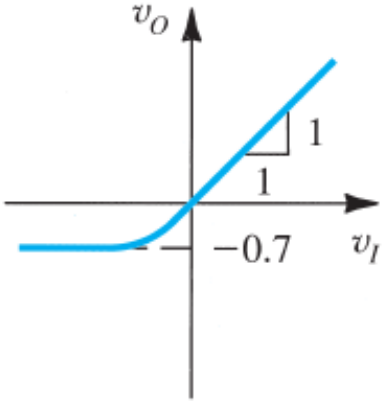




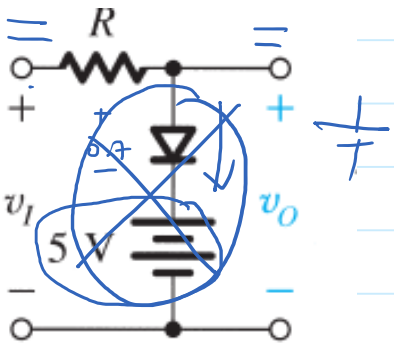


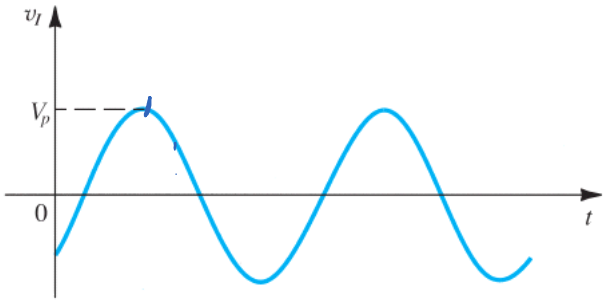


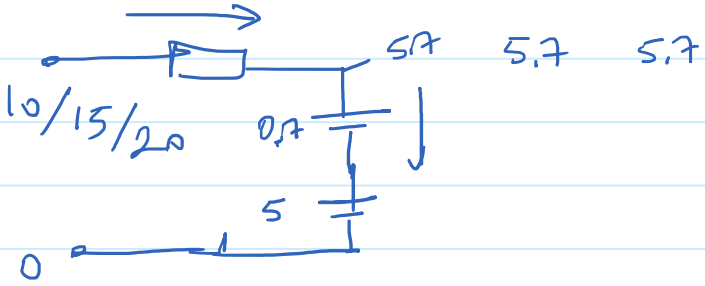


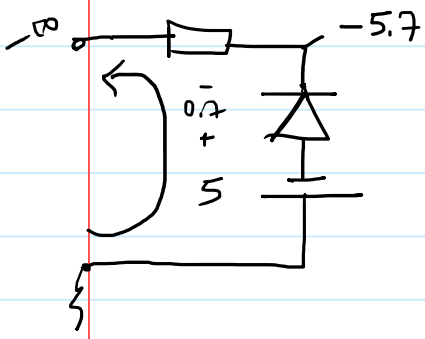


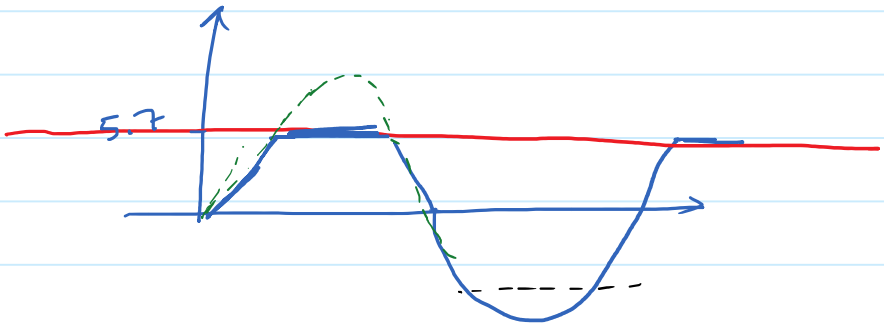
Example

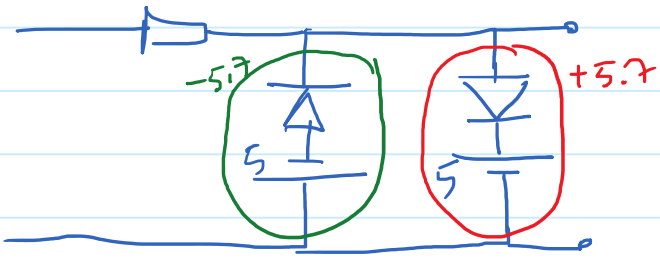


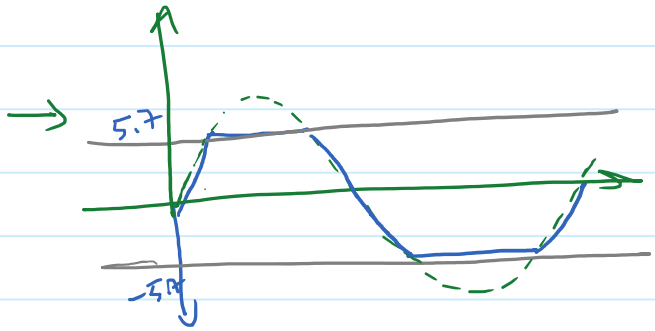




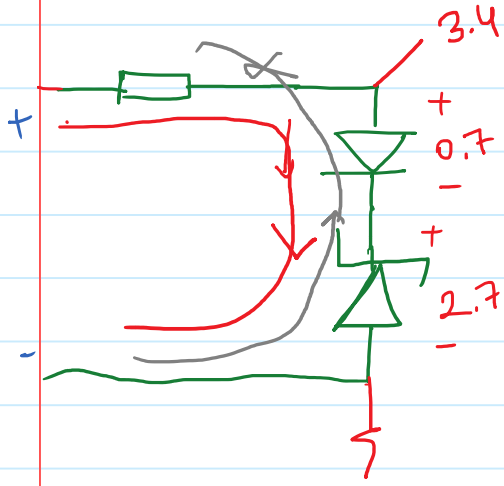


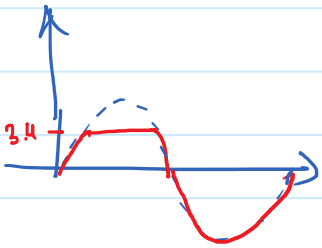


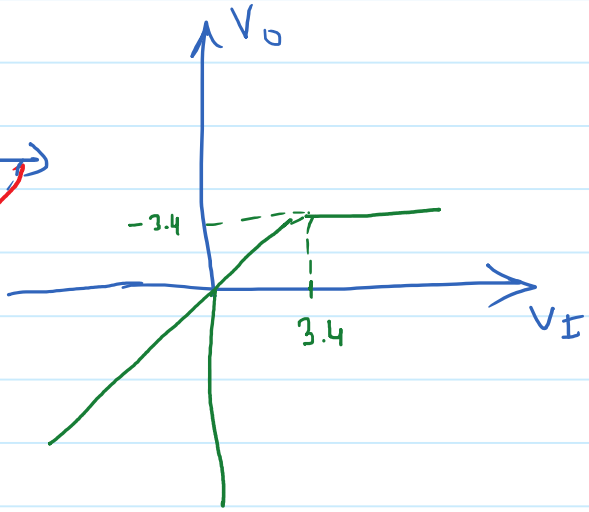




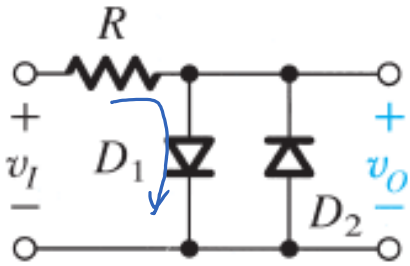
- Zener+

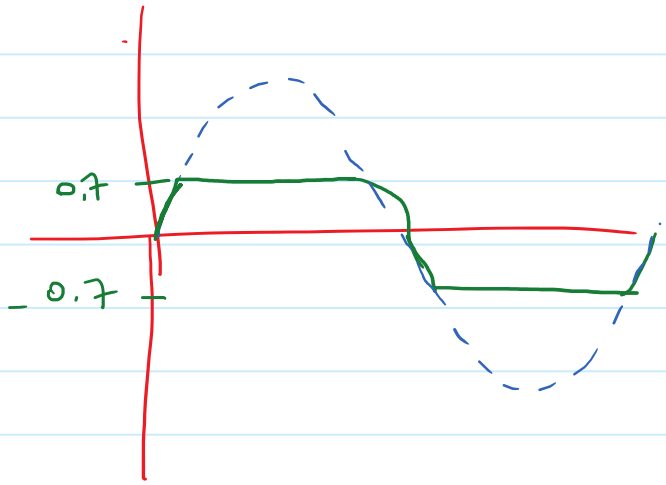


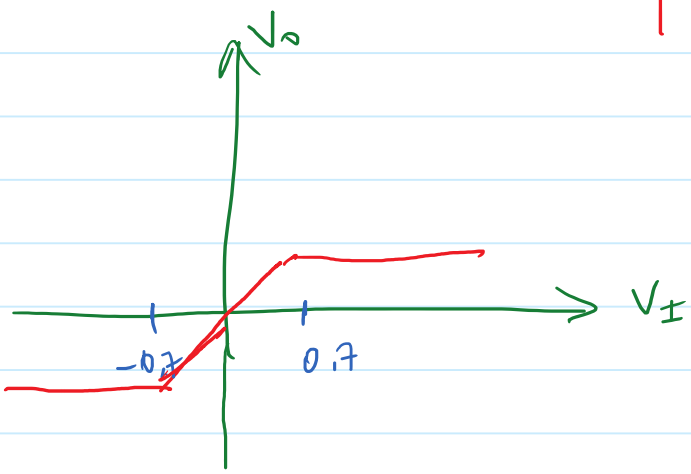


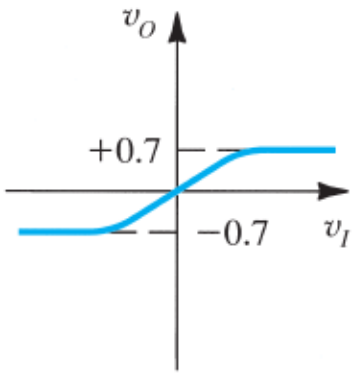


Example

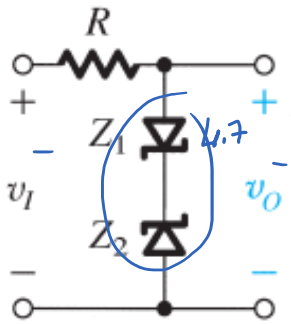


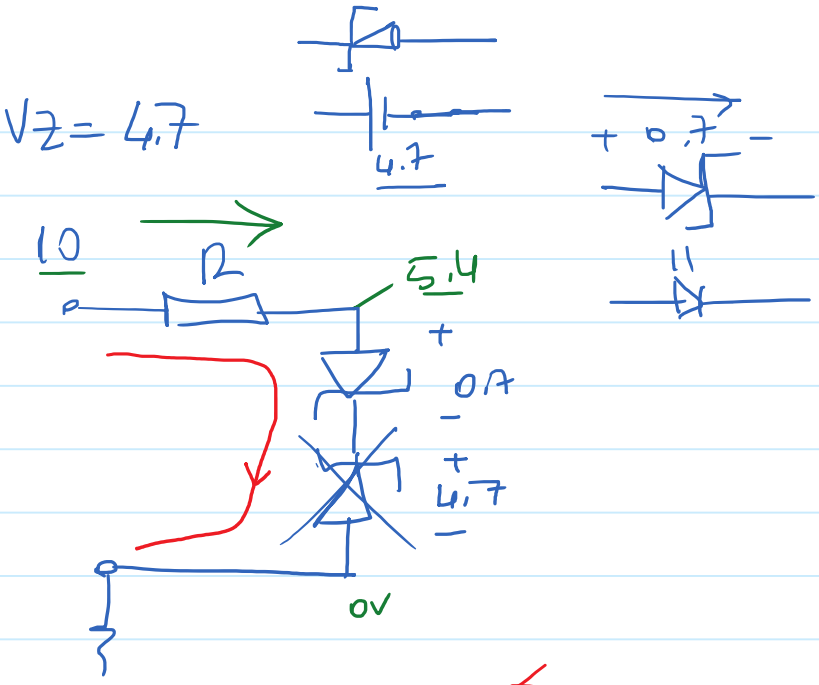


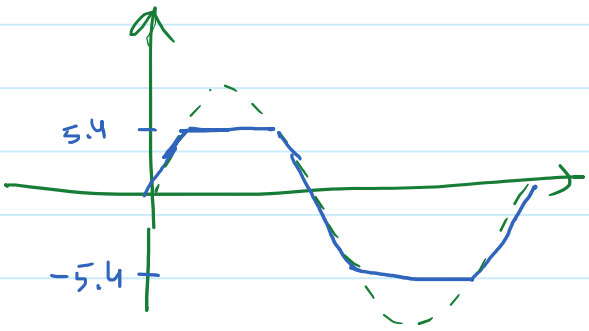


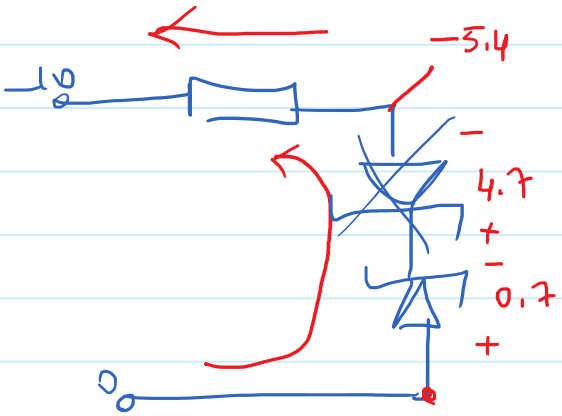


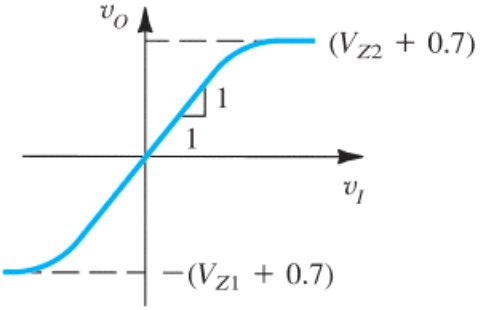
Example


R
+
v_I
−
Z_1
4.7
Z_2
+
v_O
−

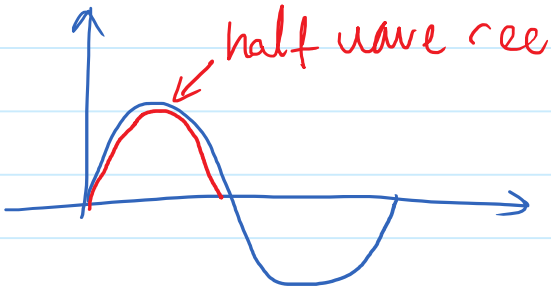

Vz = 4.7
4.7
+ 0.7 −
10
R
5.4
+
0.7
−
+
4.7
−
0V

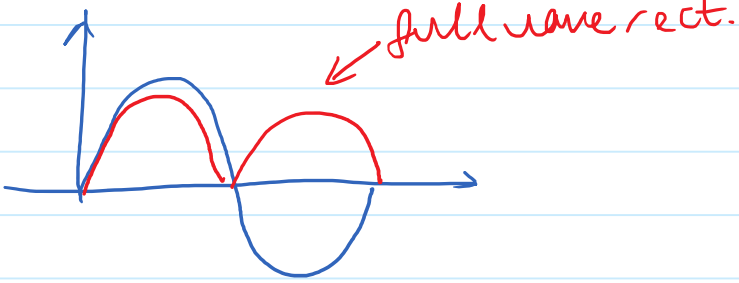

5.4
-5.4

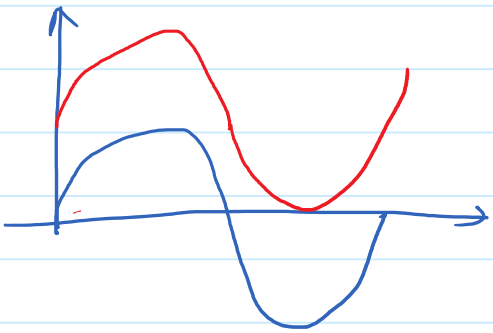

-5.4
-10
−
4.7
+
−
0.7
+
0


v_O
$(V_{Z2} + 0.7)$
1
1
v_I
$-(V_{Z1} + 0.7)$

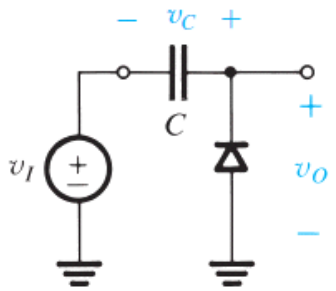
Review

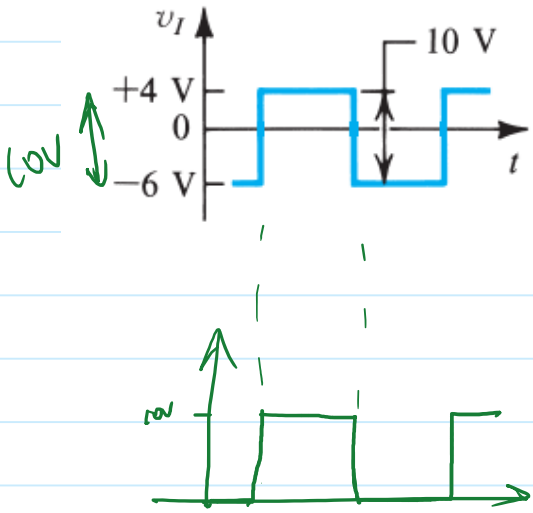


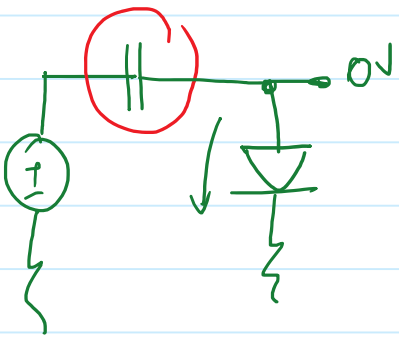


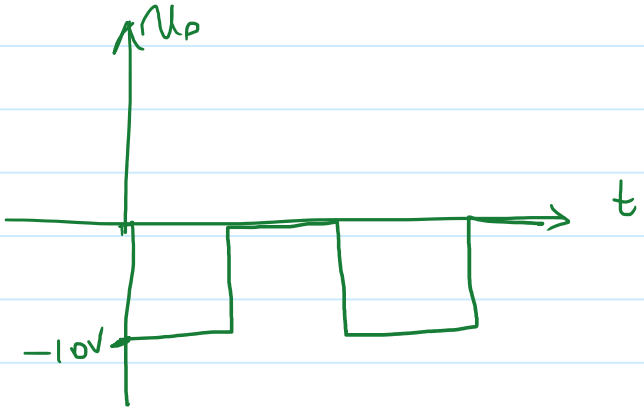


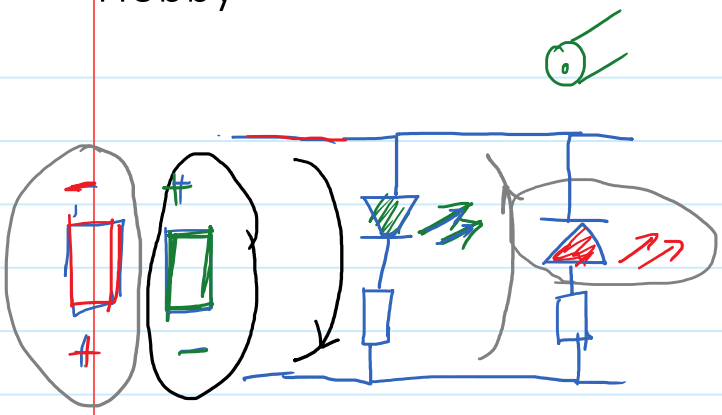
Clamping Circuit

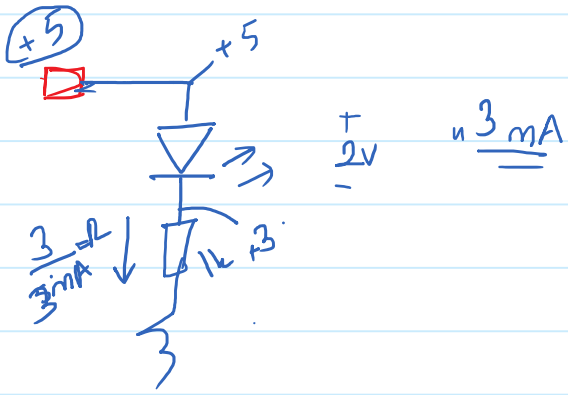











+5
+5
+
2V
-
≈ 3 mA
3
3mA
=1k
1k
+3
3