Diode Theroy (H.1)

20170331

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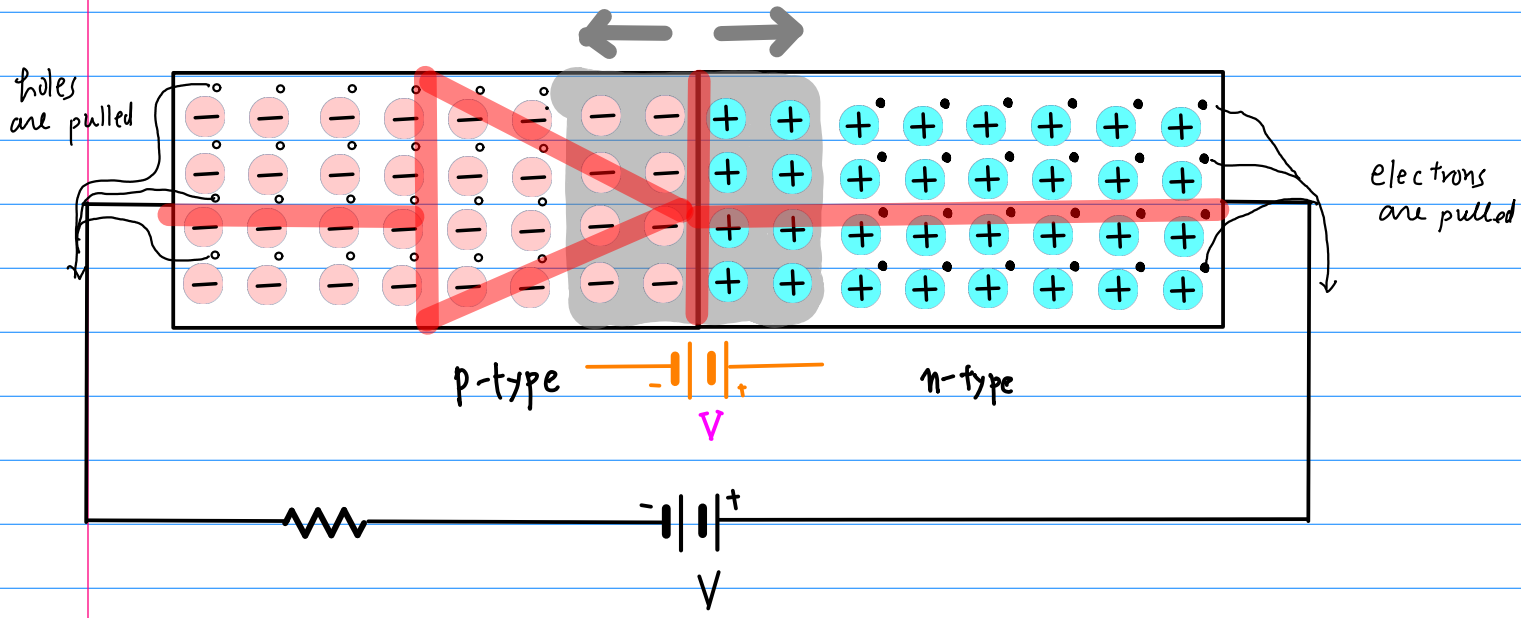
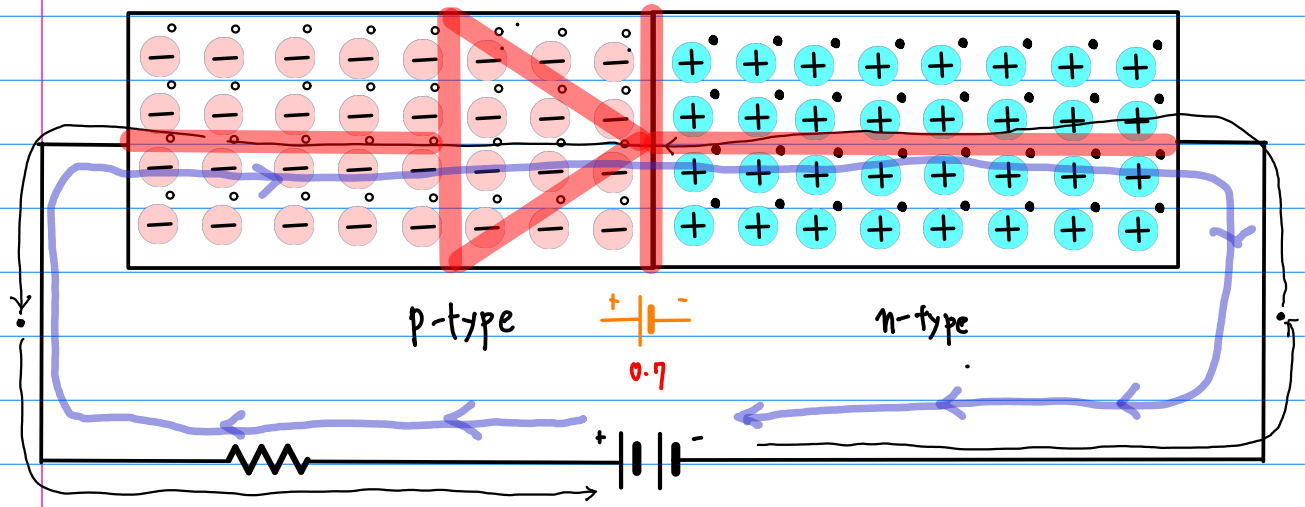
Reverse Bias

- increase depletion region
- no current flowing

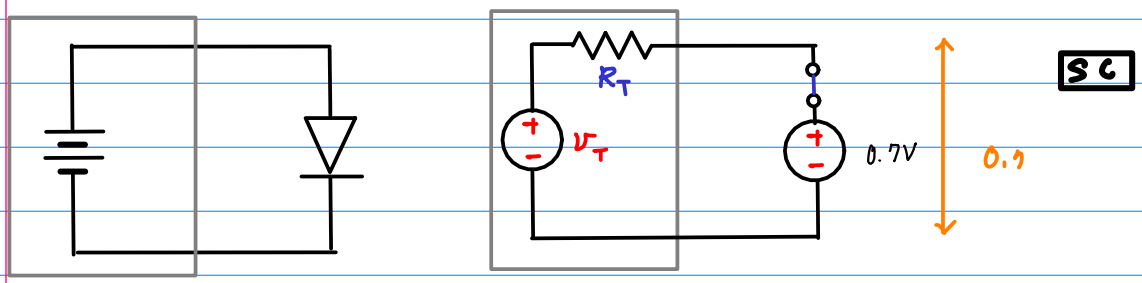


Forward Bias

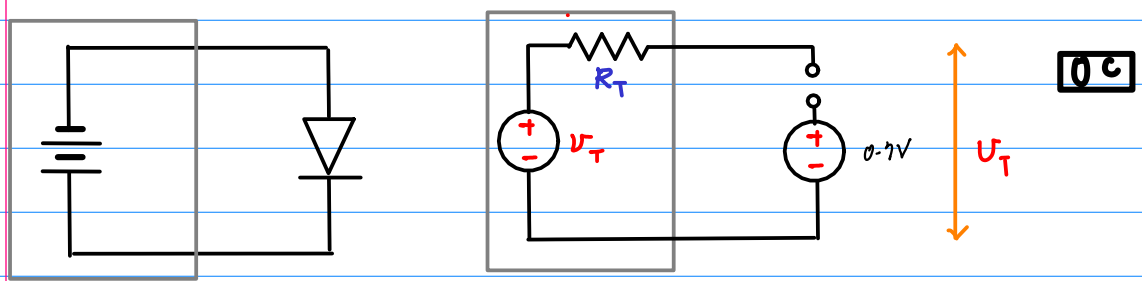
Continuous current flow



forward bias

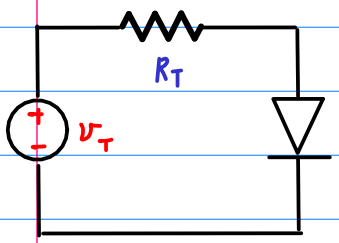


reverse bias

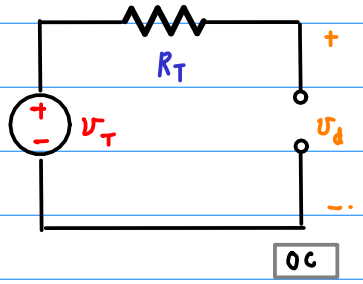


ideal model

$v_T < 0$



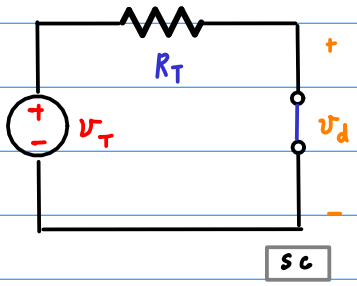
$v_T \geq 0$



OC

$R_d = \infty$

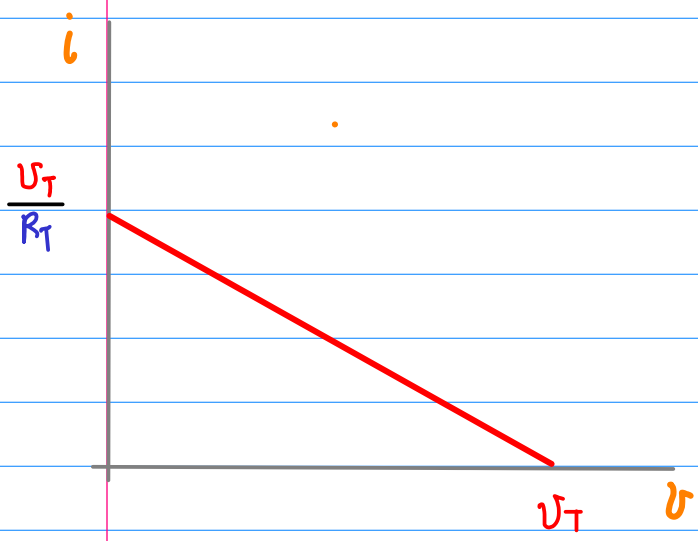
$v_d = v_T$

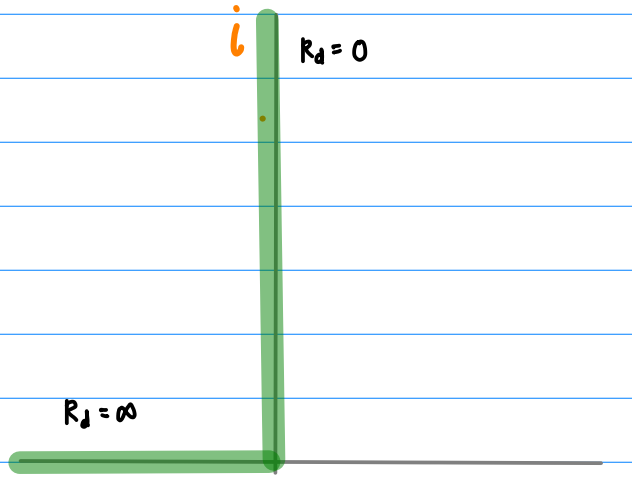


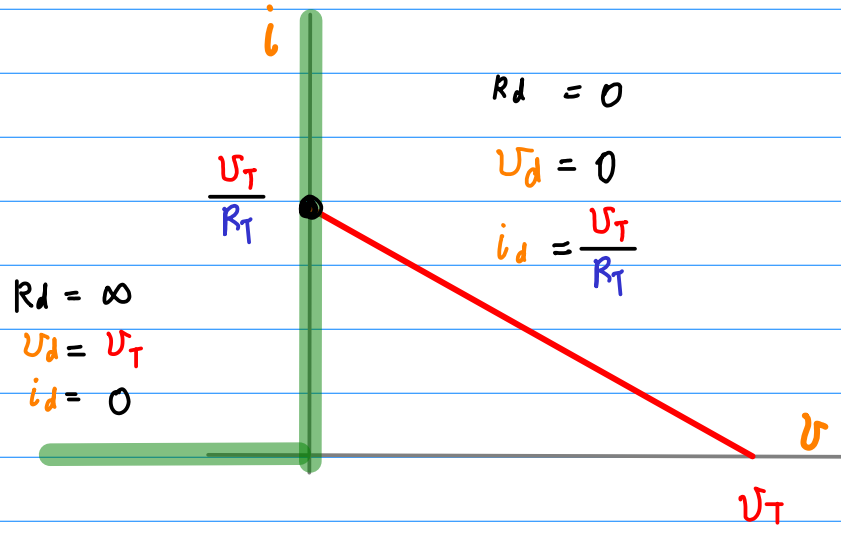
SC

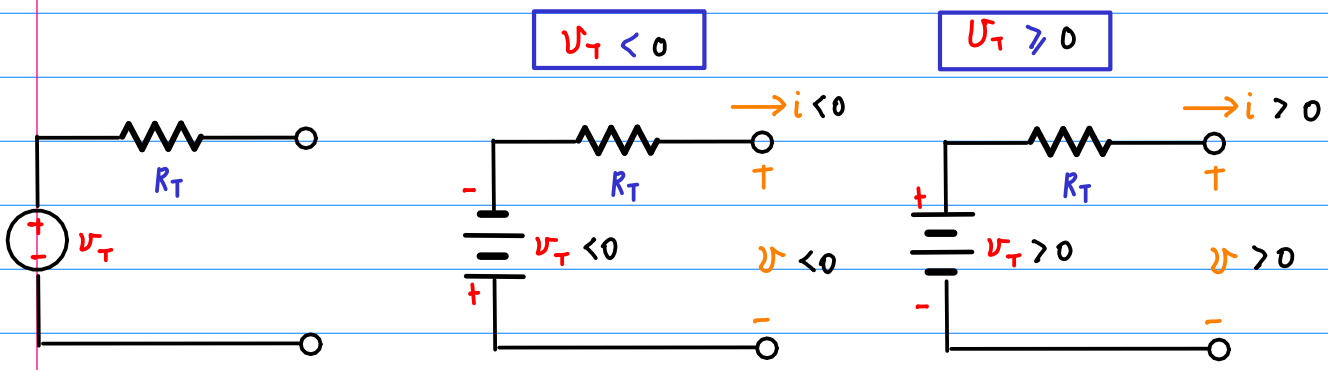
$R_d = 0$

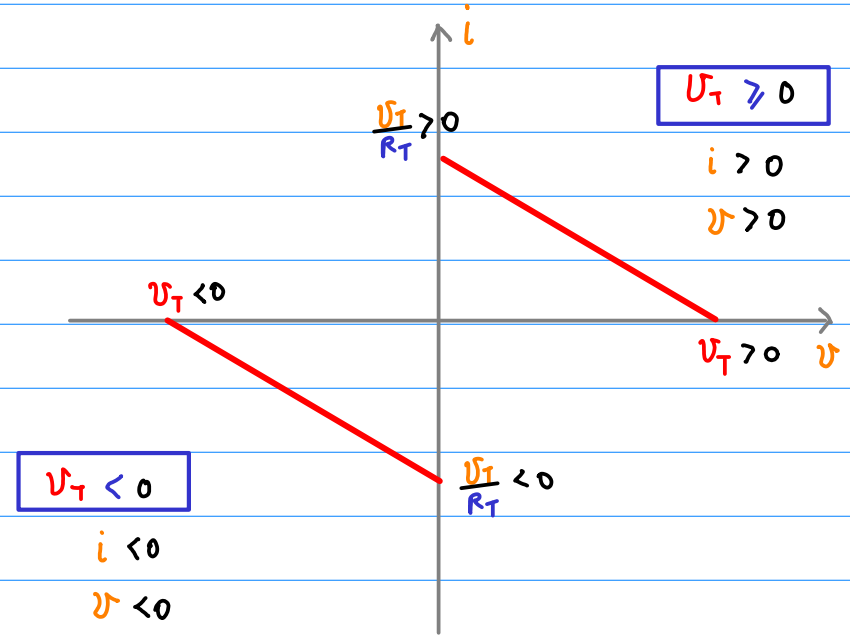
$v_d = 0$

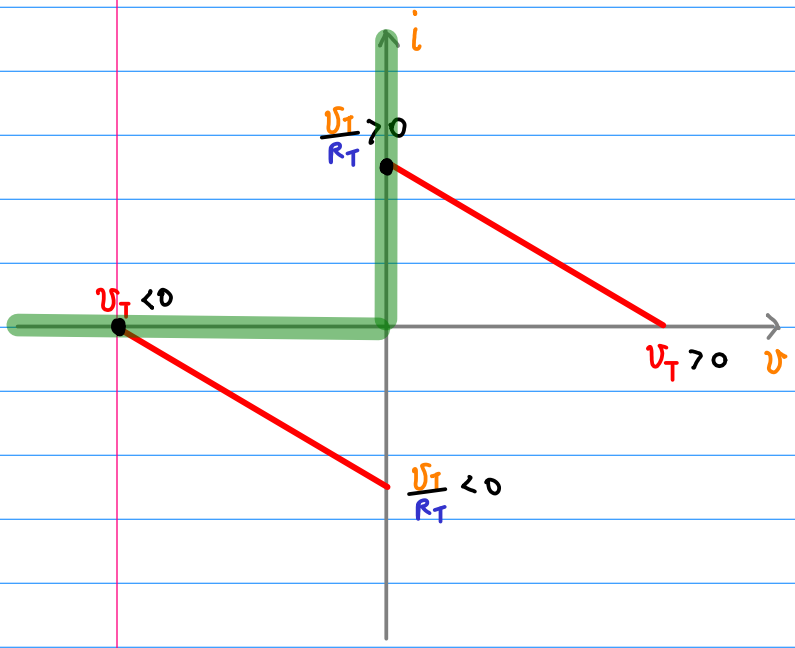


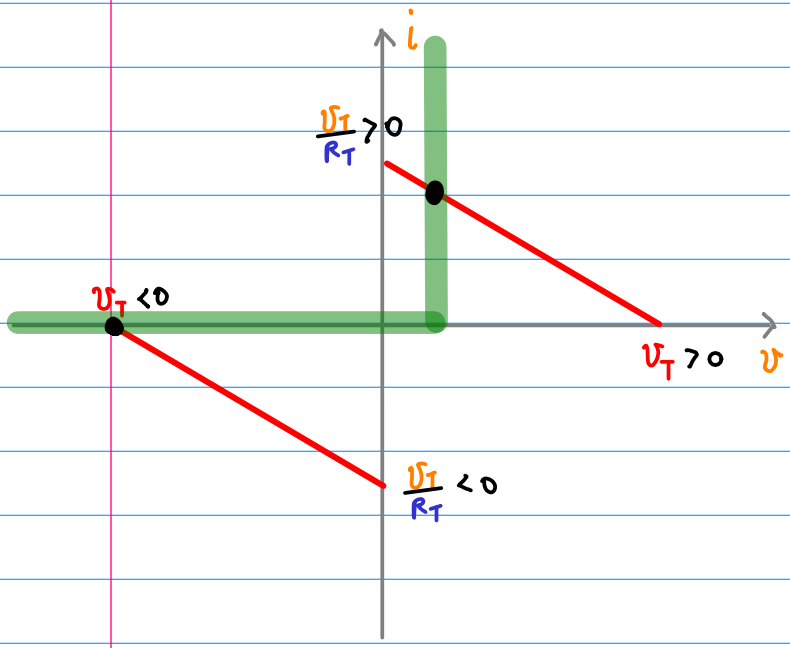


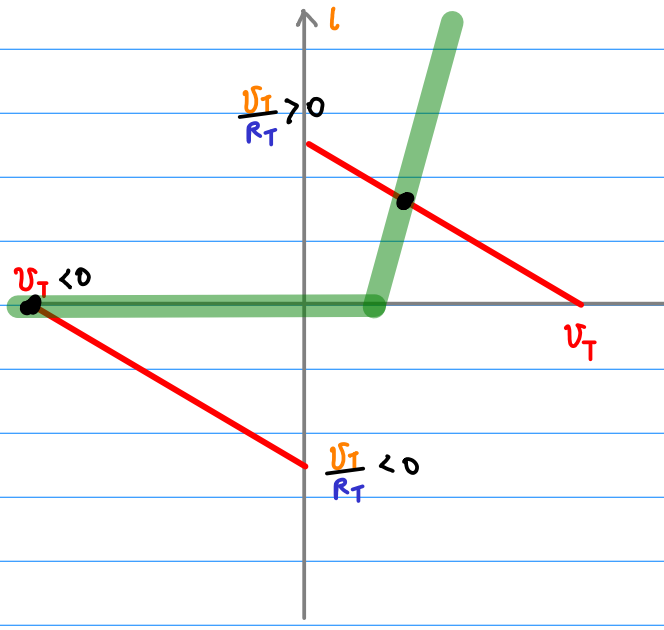



$v_T < 0$
$v_T \geq 0$
R_T
v_T
$i < 0$
$v_T < 0$
$v < 0$
$i > 0$
$v_T > 0$
$v > 0$

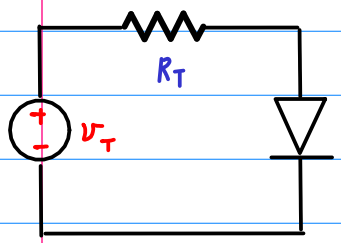

i
$\frac{v_T}{R_T} > 0$
$v_T \geq 0$
$i > 0$
$v > 0$
$v_T < 0$
$v_T > 0$
v
$\frac{v_T}{R_T} < 0$
$v_T < 0$
$i < 0$
$v < 0$

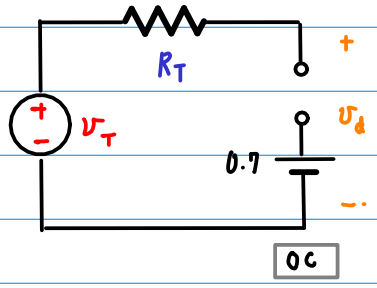

i
$\frac{v_T}{R_T} > 0$
$v_T < 0$
$v_T > 0$
v
$\frac{v_T}{R_T} < 0$


i
$\frac{v_T}{R_T} > 0$
$v_T < 0$
$v_T > 0$
v
$\frac{v_T}{R_T} < 0$


i
$\frac{v_T}{R_T} > 0$
$v_T < 0$
v_T
$\frac{v_T}{R_T} < 0$

$v_T < 0.7$

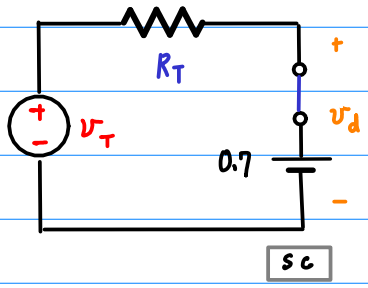




$R_d = \infty$

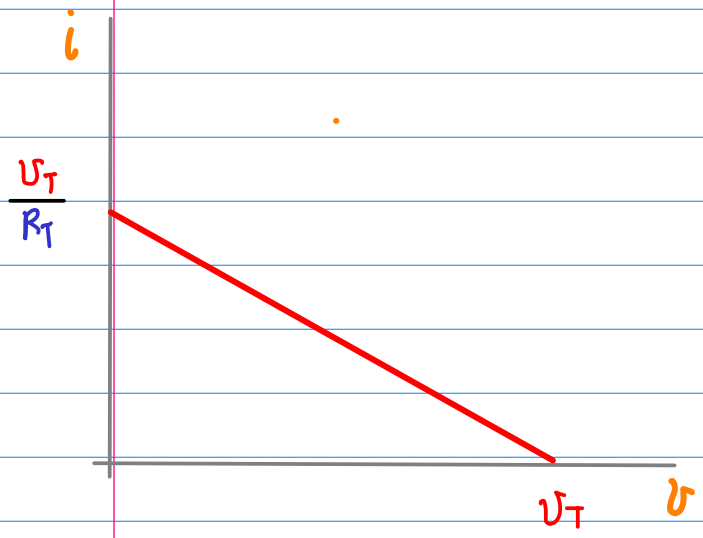
$v_d = v_T$

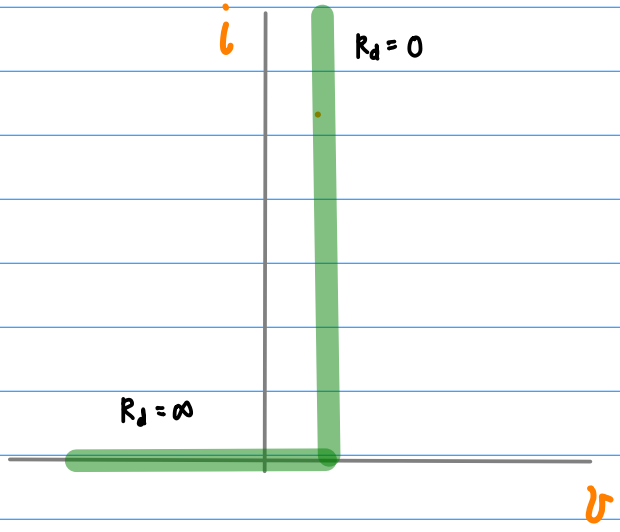
$v_T > 0.7$

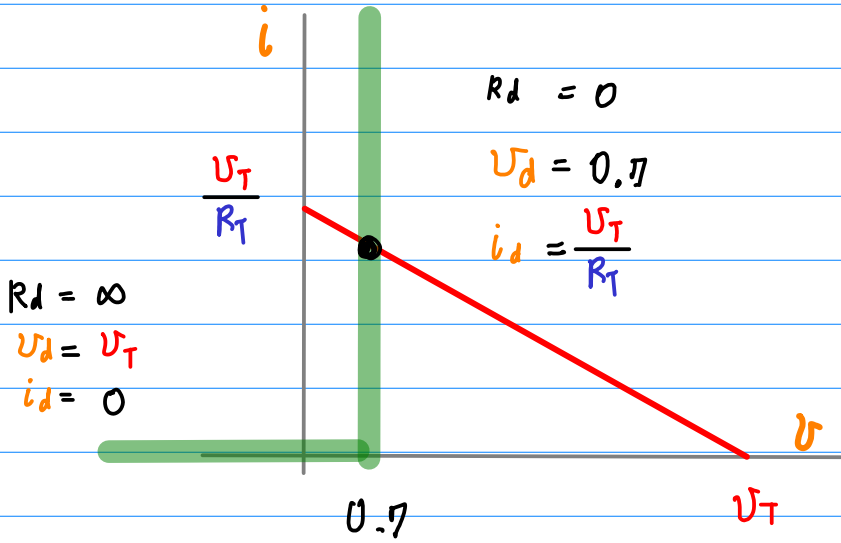


$R_d = 0$

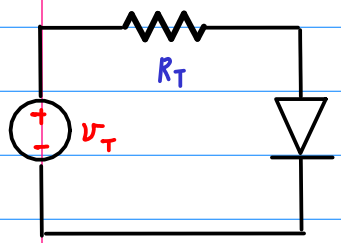
$v_d = 0.7$

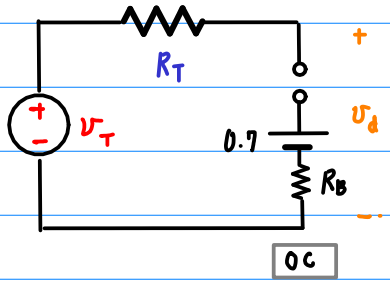






$v_T < 0.7$

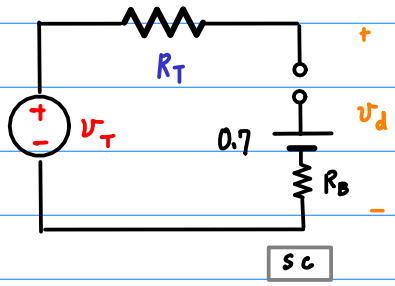




$R_d = \infty$

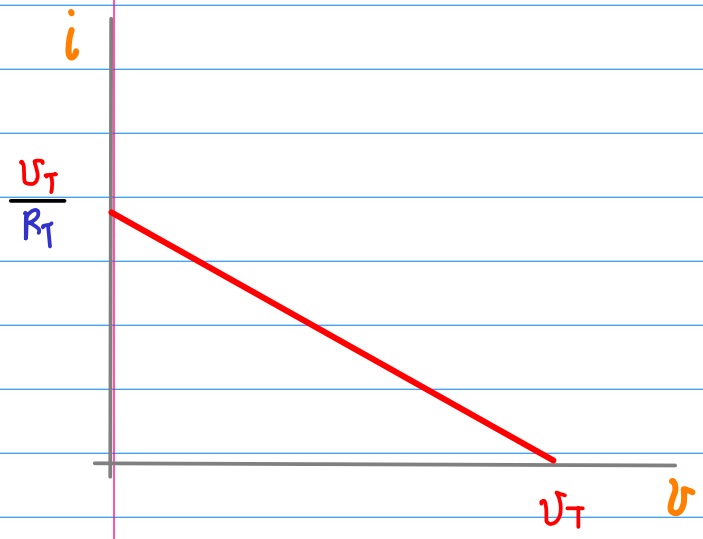
$v_d = v_T$

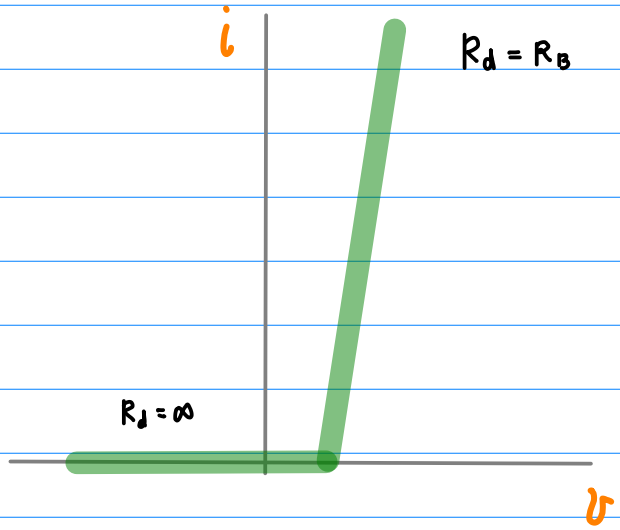
$v_T > 0.7$

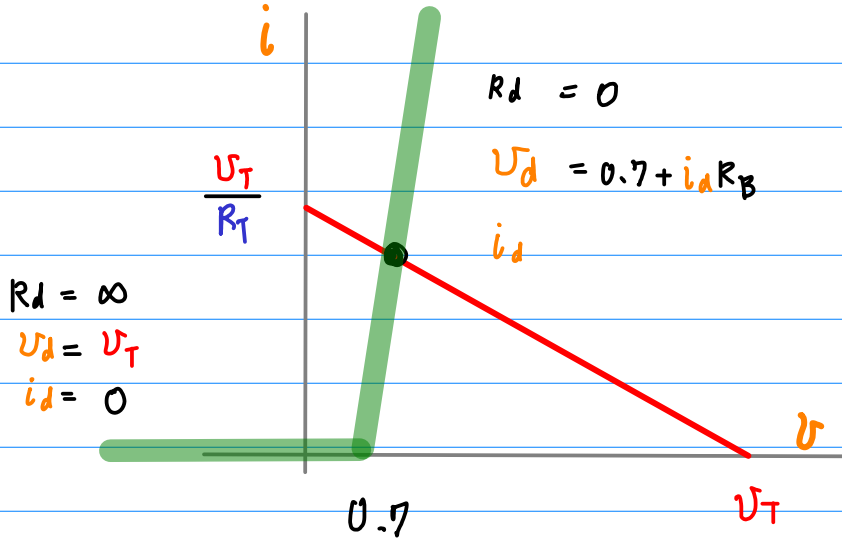


$R_d = 0$

$v_d = 0.7 + i_d R_B$



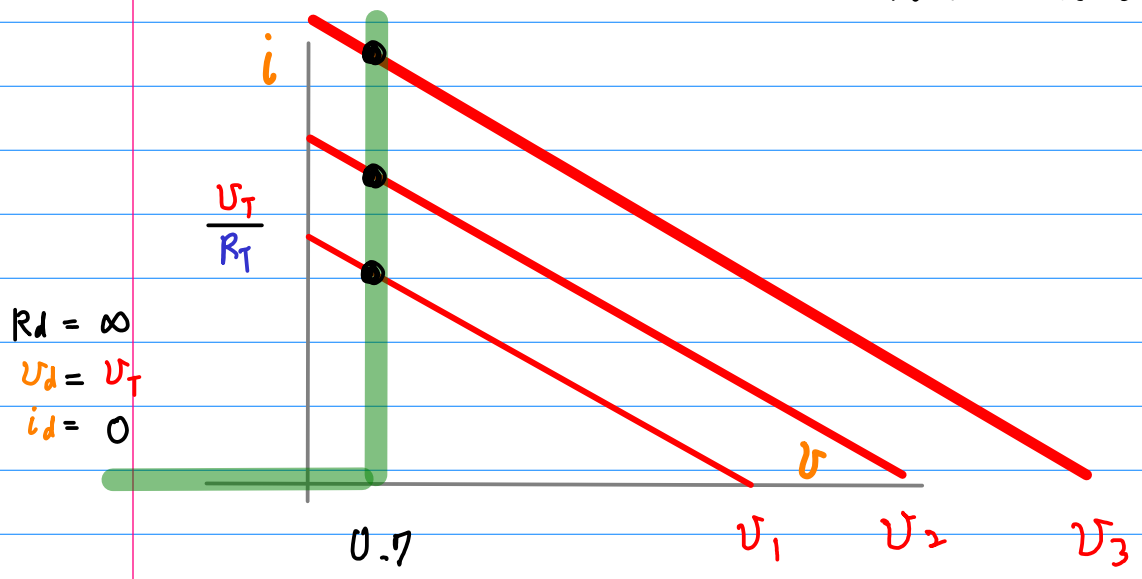


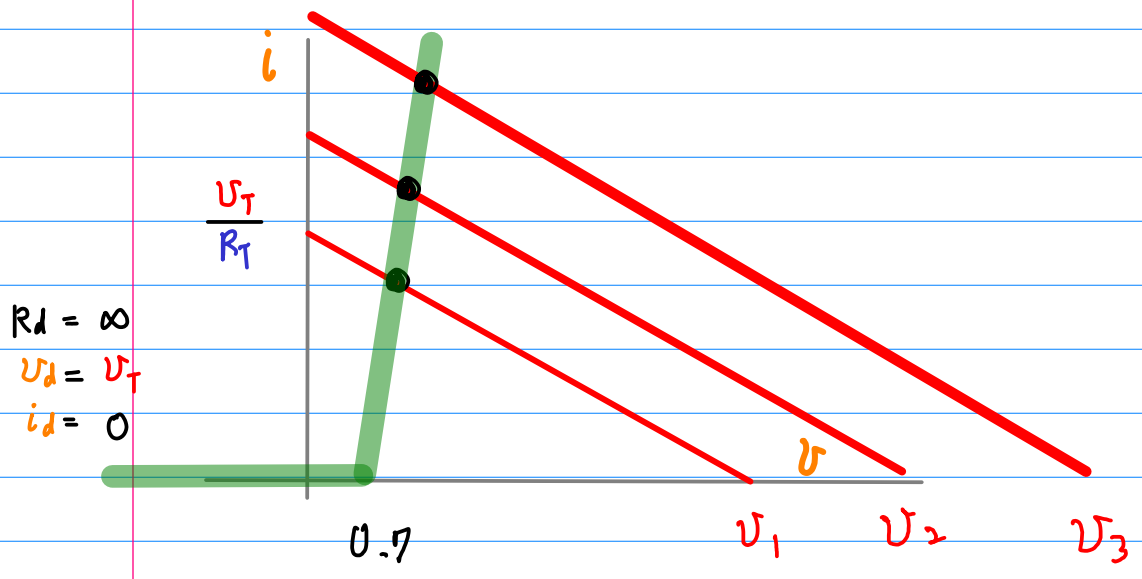


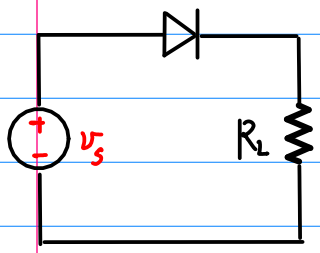
Increasing V_T

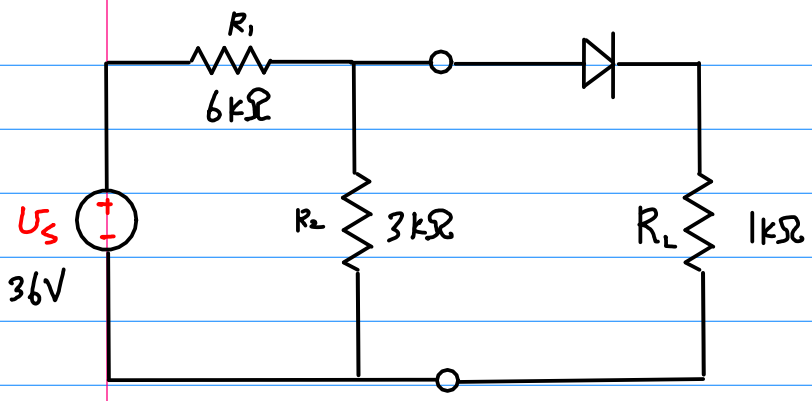
v_d in the vicinity of 0.7

whenever the diode is on

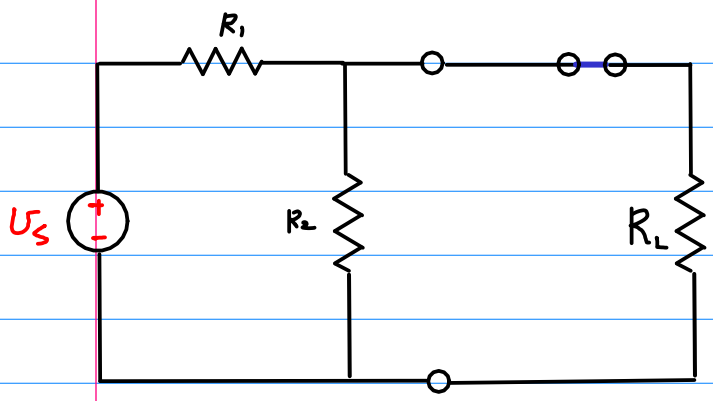


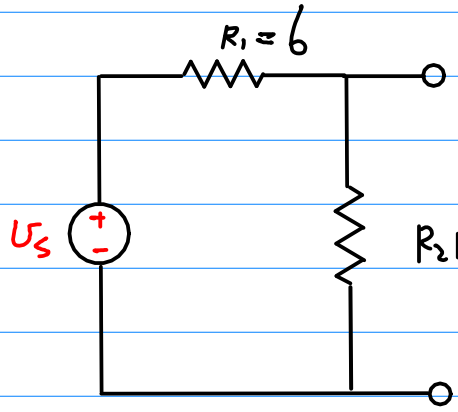



+
−
v_s
R_L



Assume ideal diode is 0Ω





$R_2 \parallel R_L = \frac{3 \cdot 1}{3+1} = \frac{3}{4}$

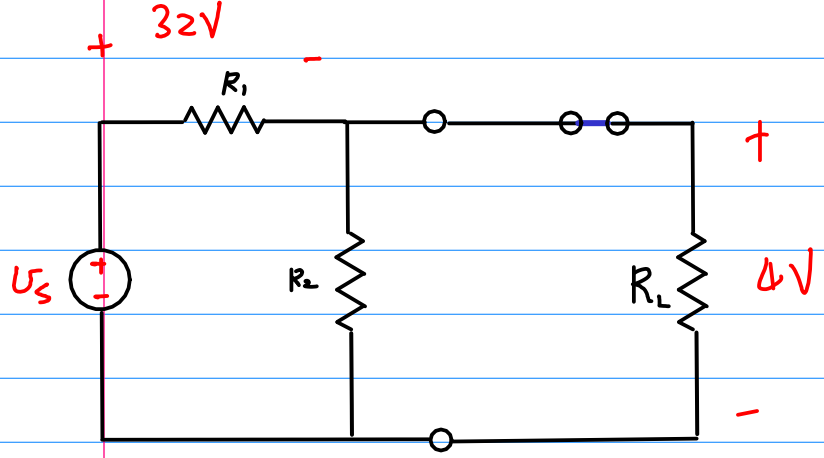
Voltage divider

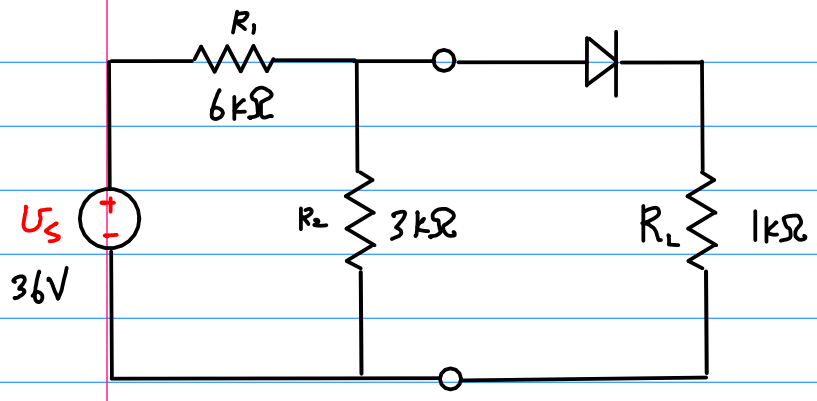
$6 : \frac{3}{4} = 24 : 3$

$= 8 : 1$

$36 \cdot \frac{8}{8+1} : 36 \frac{1}{8+1}$

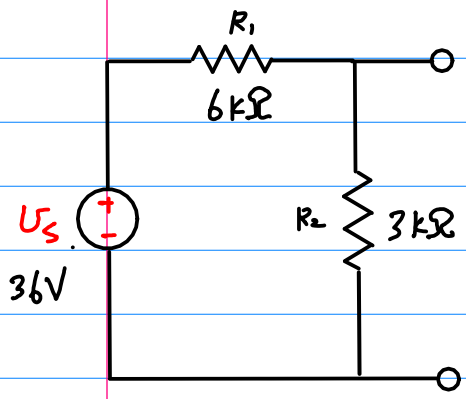
$32 : 4$

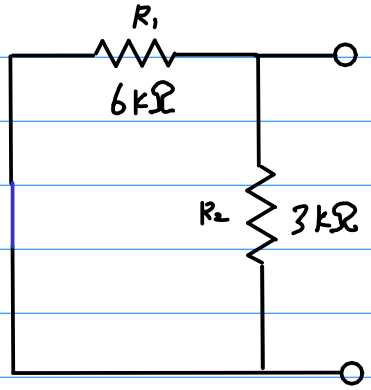




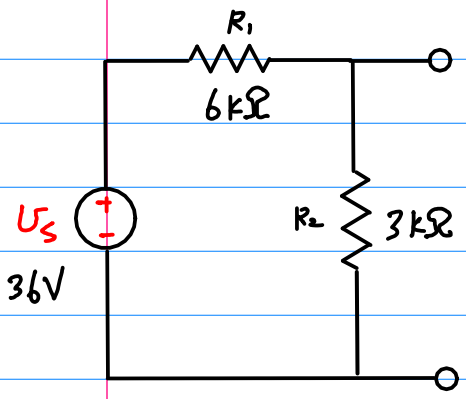
Reduce Series Circuit

Use Thevenin Eq





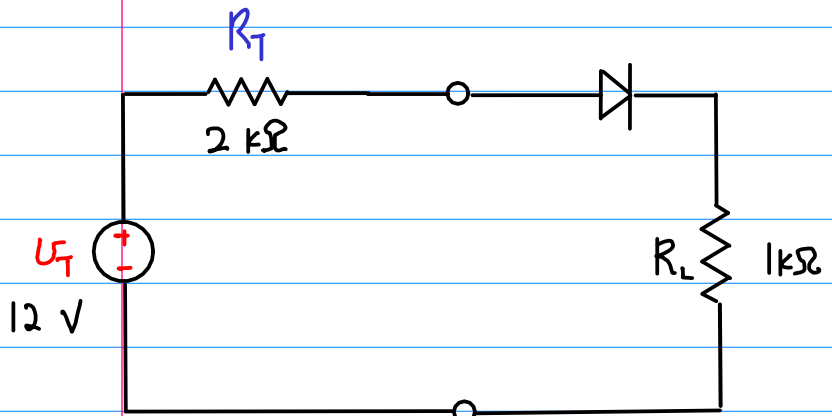
$R_T = \frac{3 \cdot 6}{3+6} = 2$



+

$V_T = \frac{3}{3+6} V_S = \frac{1}{3} V_S$

−



$V_L = \frac{1}{2+1} \cdot 12 = 4V$