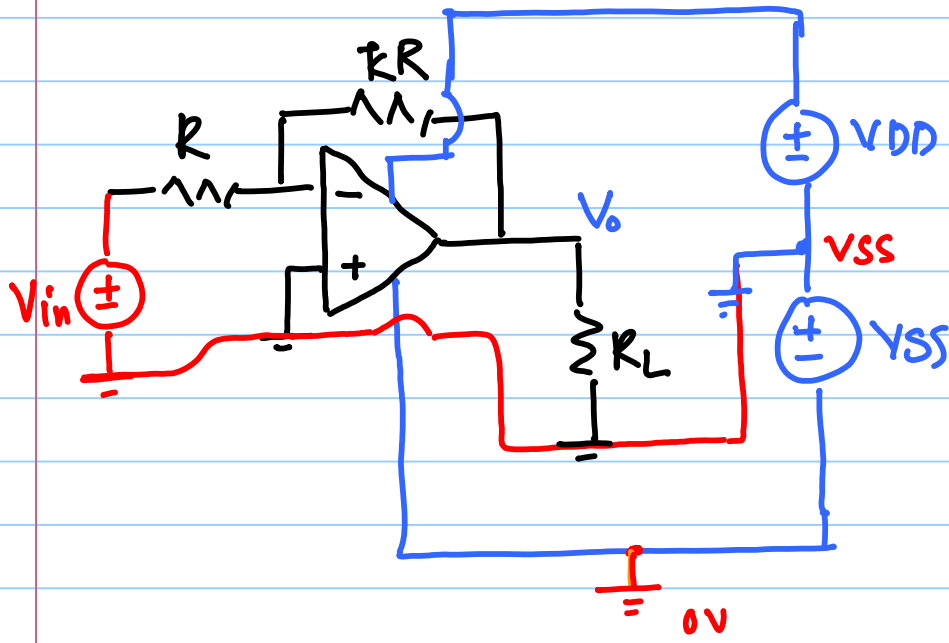
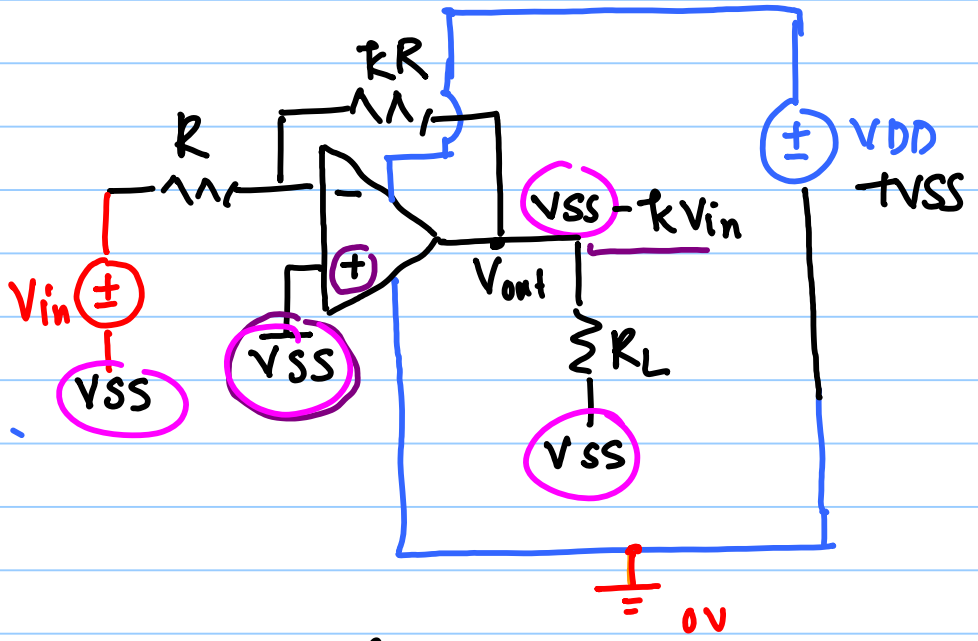
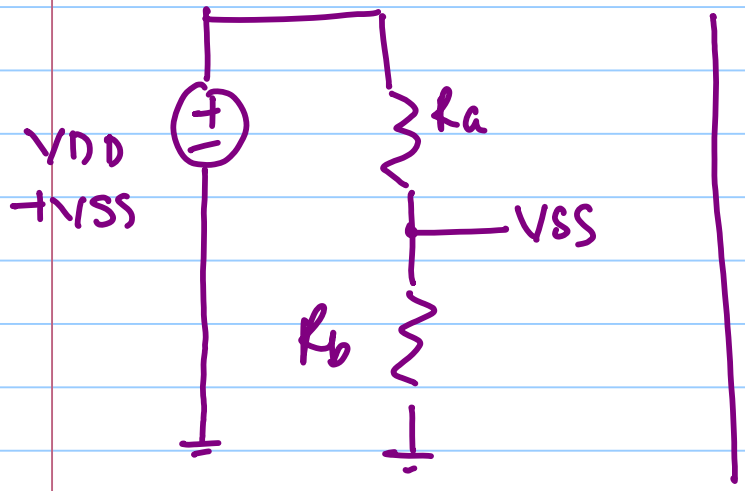
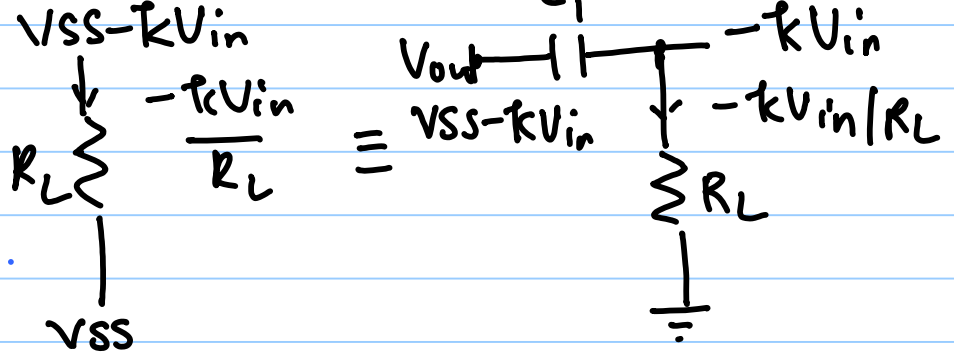
Lecture #11

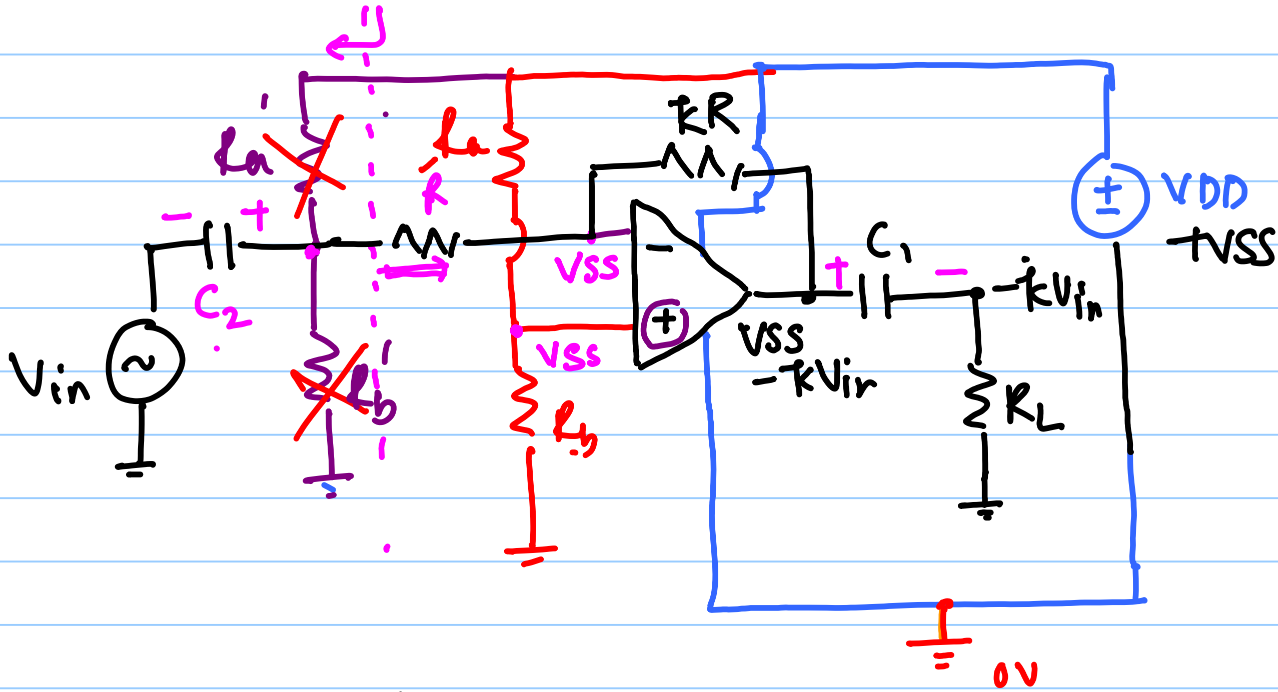
Note Title 09-02-2022

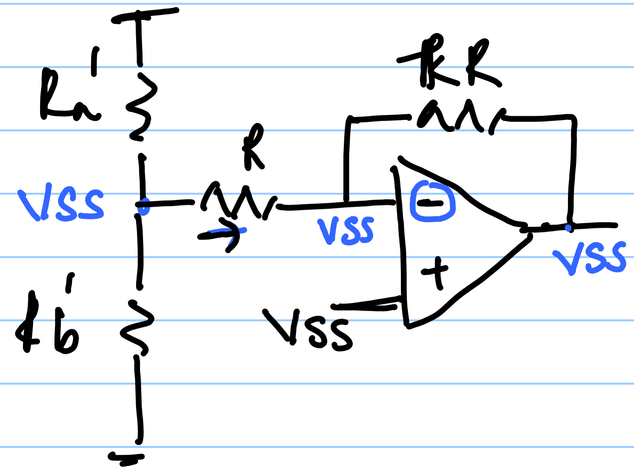


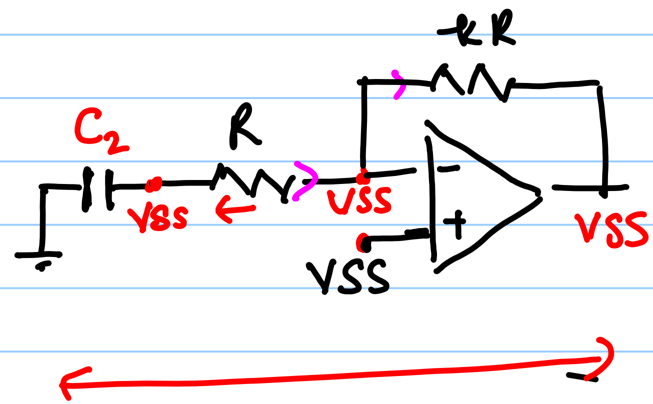


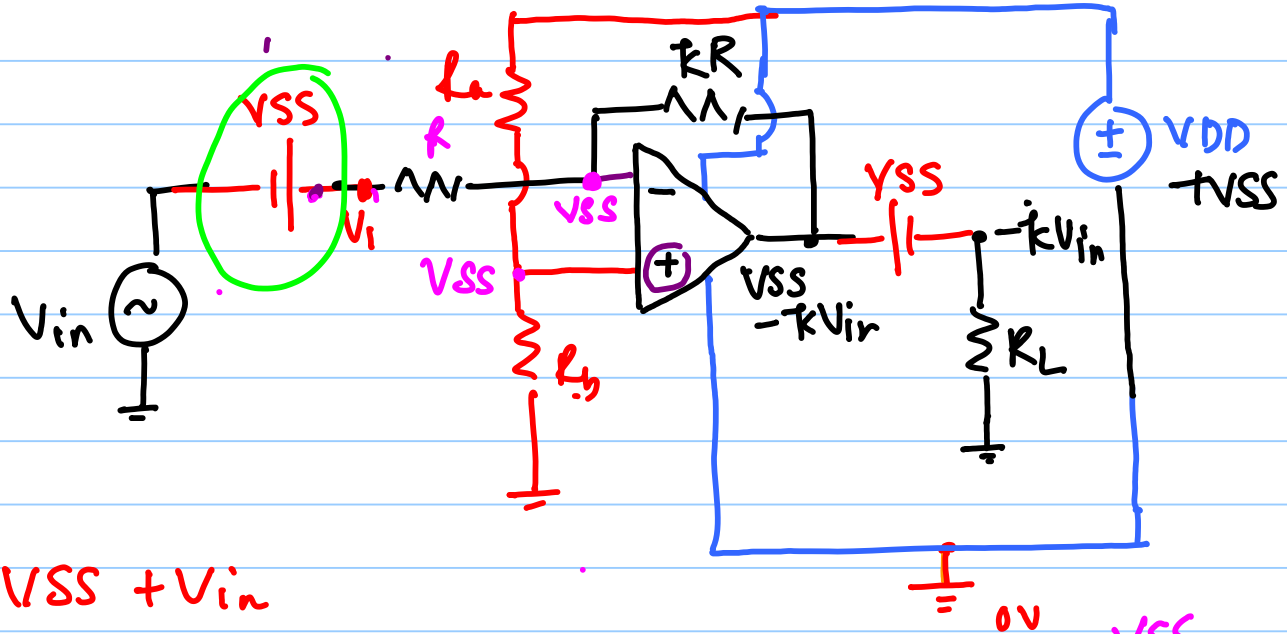




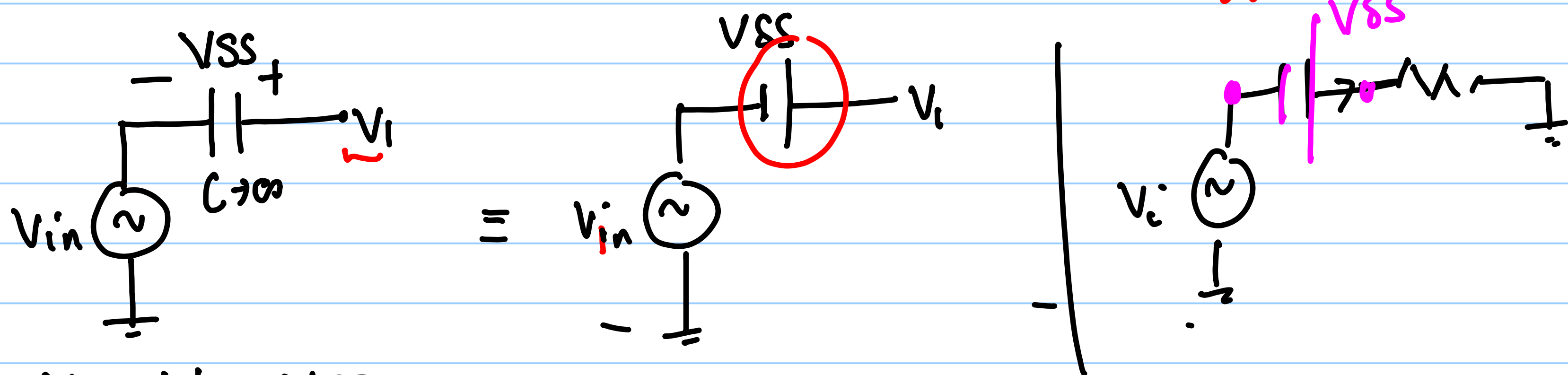

Vin
C2
Ra
Rb
R
VSS
VSS
kR
C1
VSS
-kVin
-kVin
RL
VDD
+VSS
0V


Ra'
Rb'
R
kR
VSS
VSS
VSS
VSS

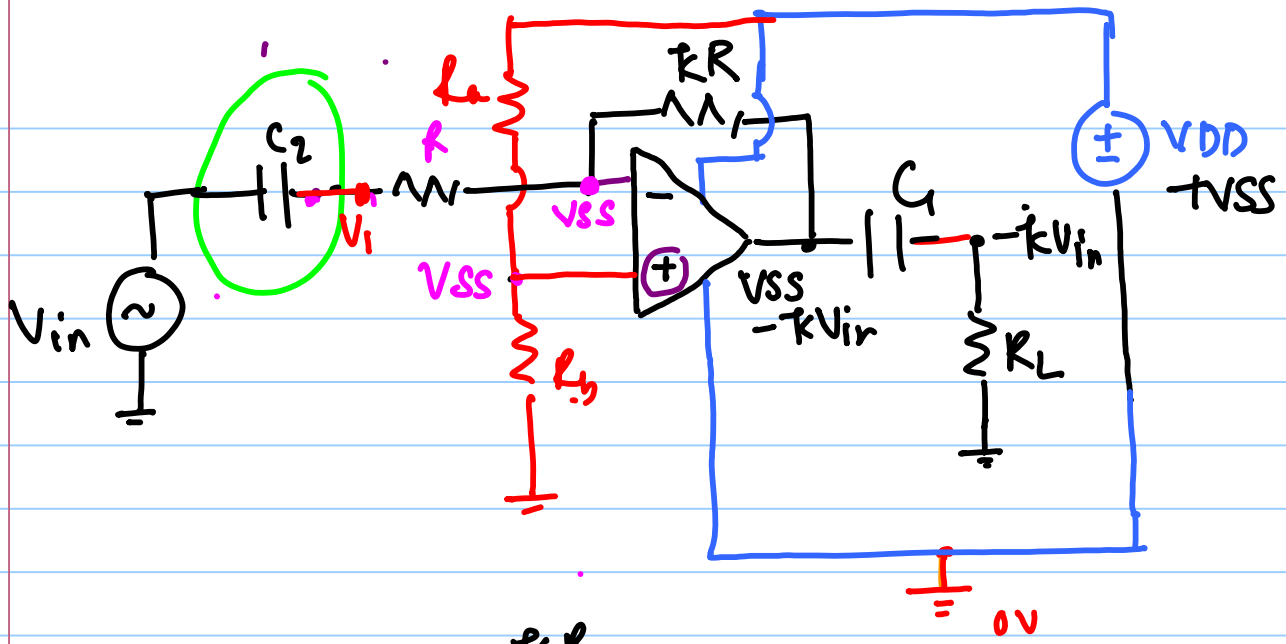

C2
R
kR
VSS
VSS
VSS
VSS

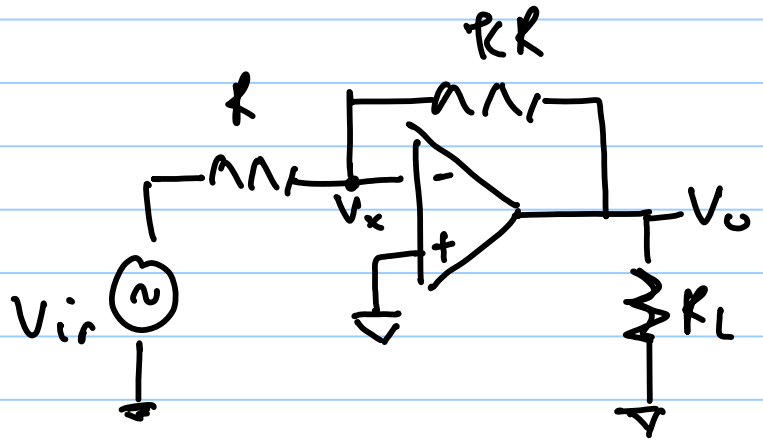


$V_1 = VSS + V_{in}$



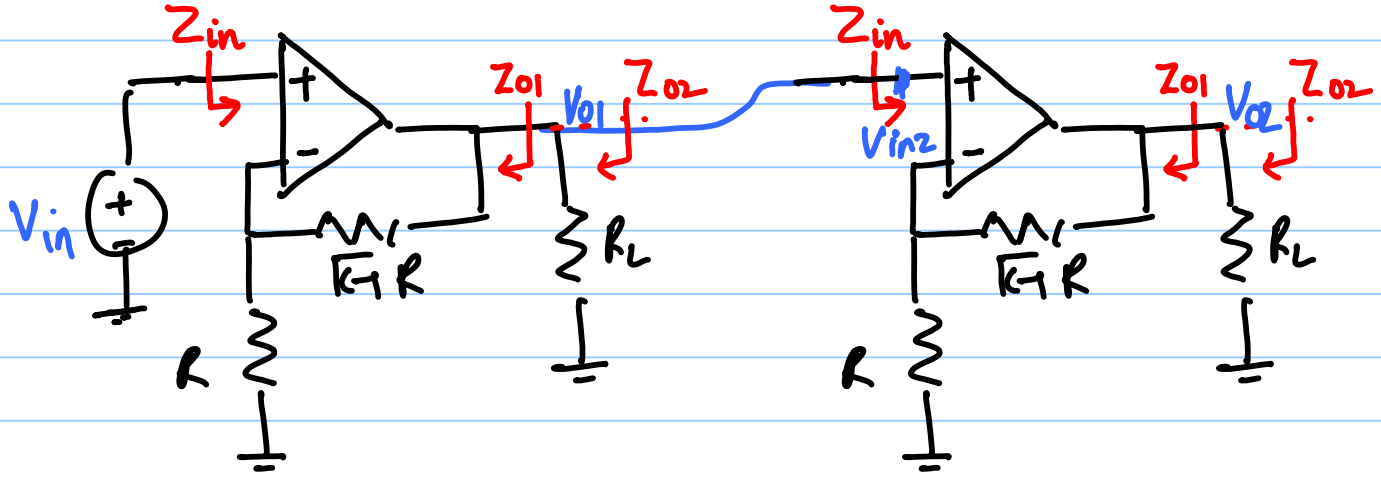
$V_1 = V_{in} + VSS$


C2
R
kR
Vin
V1
Vss
Vss
kR
C1
VDD
-VSS
Vss
-kVin
-kVin
RL
0V

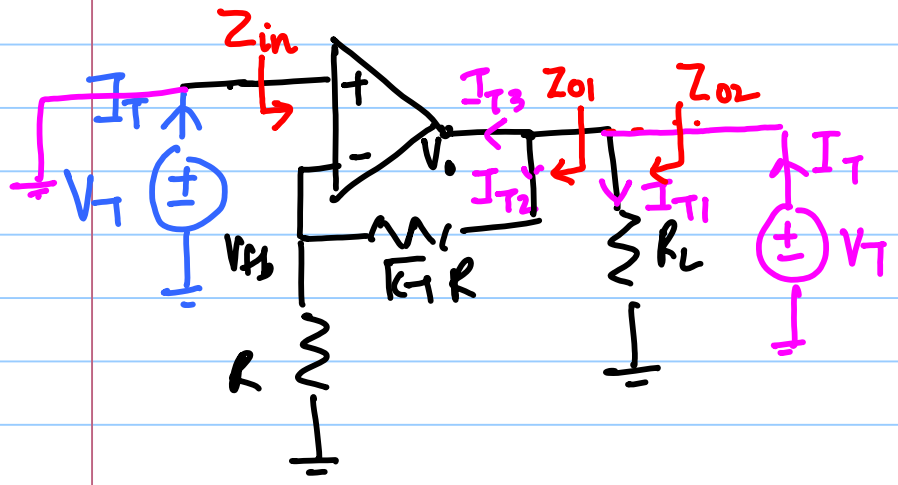

kR
R
Vx
Vo
Vin
RL

$V_x = 0$ ✓

$V_o = -kV_{in}$ ✓



$$\frac{V_{o2}}{V_{in}} = \frac{V_{o1}}{V_{in}} \times \frac{V_{o2}}{V_{in2}}$$



$$Z_{in} = \frac{V_T}{I_T} = \infty$$

$$I_{T1} = \frac{V_T}{R_L}$$

$$I_{T2} = \frac{V_T}{K \cdot R}$$

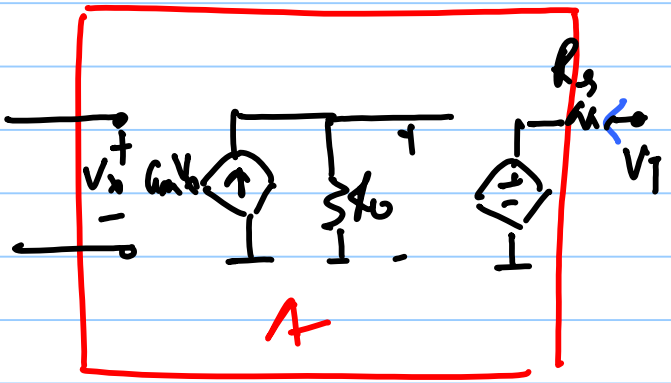
$$V_{fb} = \frac{V_T}{K}$$

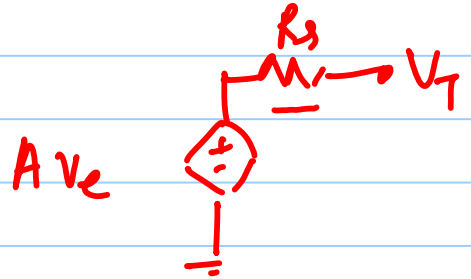
$$V_o = A\left(0 - \frac{V_T}{K}\right)$$

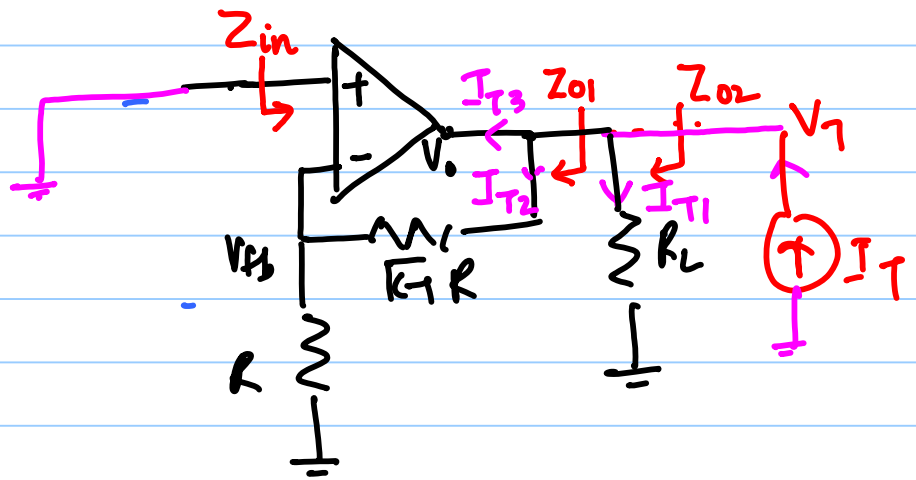
$$V_T = A\left(0 - \frac{V_T}{K}\right)$$

$$V_T\left(1 + \frac{A}{K}\right) = 0$$

$$V_T = 0$$







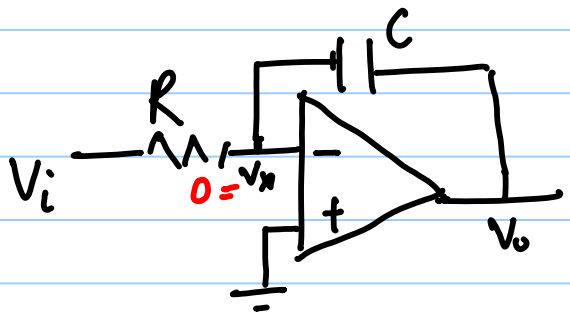
$$I_T = I_{T1} + I_{T2} + I_{T3}$$

$$A\left(0 - \frac{V_T}{R}\right) = V_T$$

$$\Rightarrow V_T = 0$$

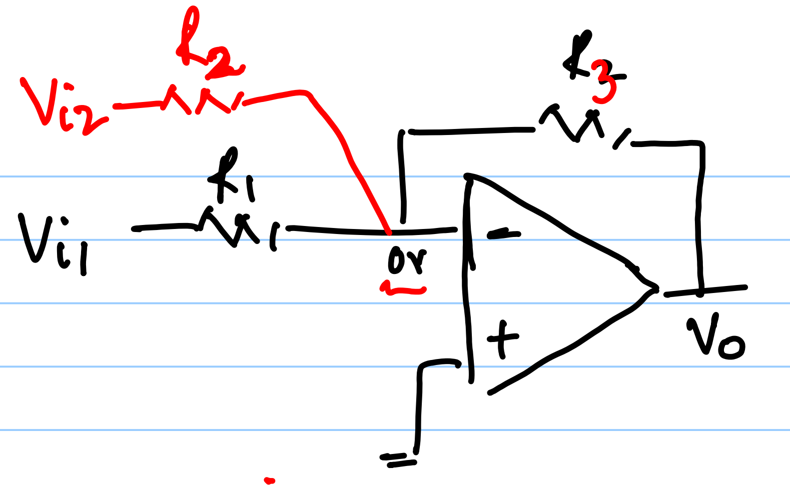
$$\frac{V_T}{I_T} = \frac{0}{I_T} = 0$$

Opamp as integrator



$$\frac{V_i - 0}{R} = +C\,\frac{d(0 - V_o)}{dt}$$

$$\frac{dV_o}{dt} = \frac{-V_i}{RC}$$



$$V_o = -\frac{R_3}{R_1} \cdot V_{i1} - \frac{R_3}{R_2} V_{i2}$$