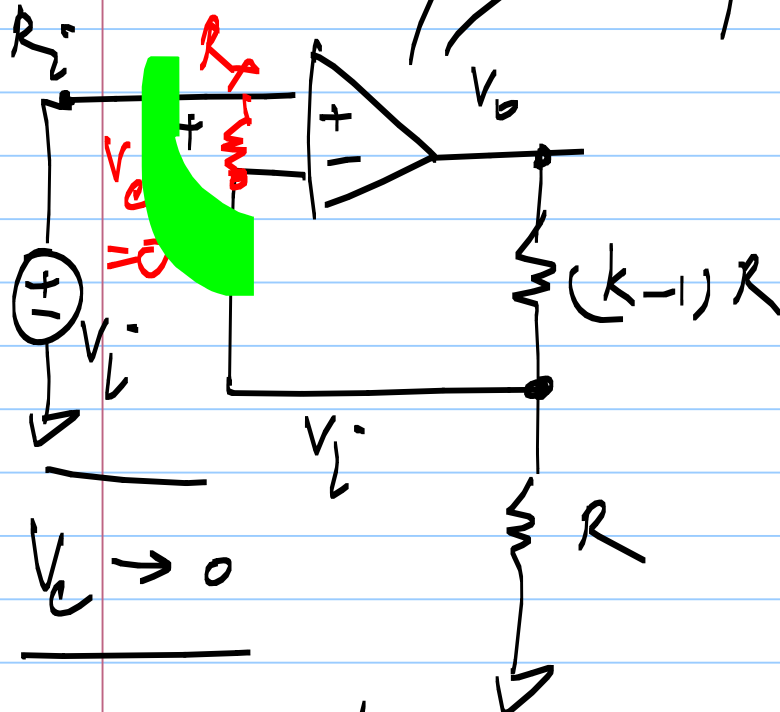
EE2019

VCVS

24/1/2017

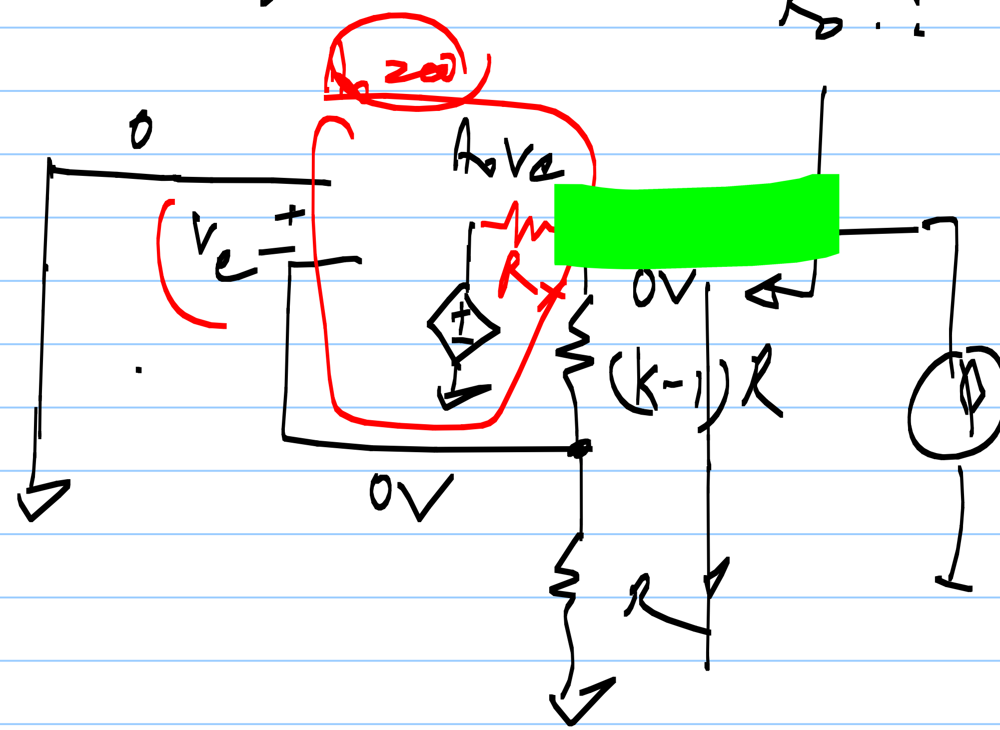
Integrator: $V_o = \omega_u \int V_e \cdot dt$

Amplifier: $V_o = A_o \cdot V_e$



$R_i := \infty$

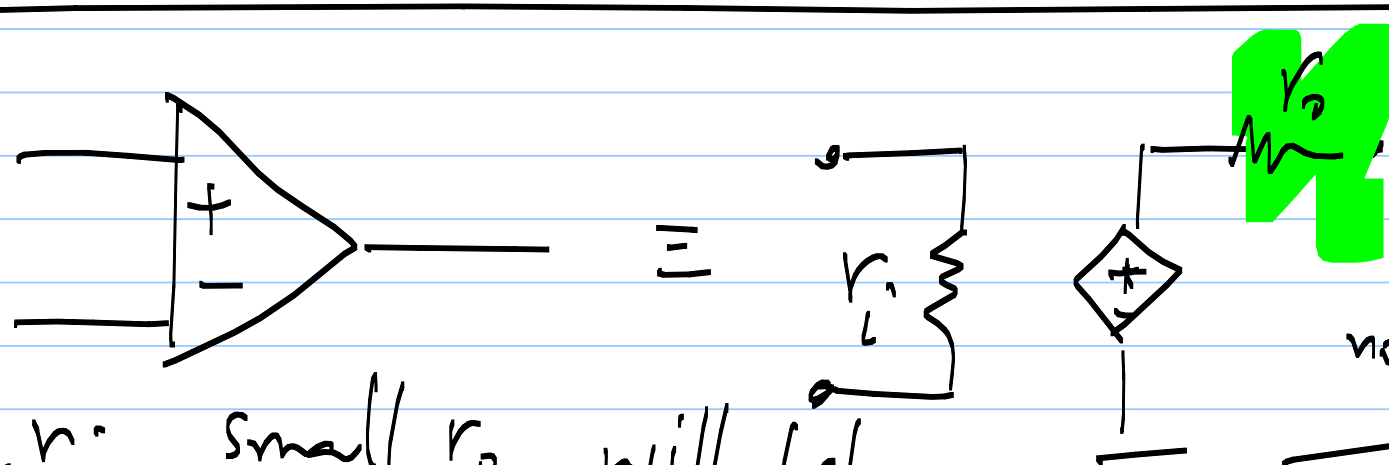
$R_o : ?$



$V_e \to 0$

opamp inputs are virtually shorted

$A_o = \infty$: $R_i = \infty$, $R_o = 0$ for the amplifier regardless of the i/p & o/p resistances of the opamp.



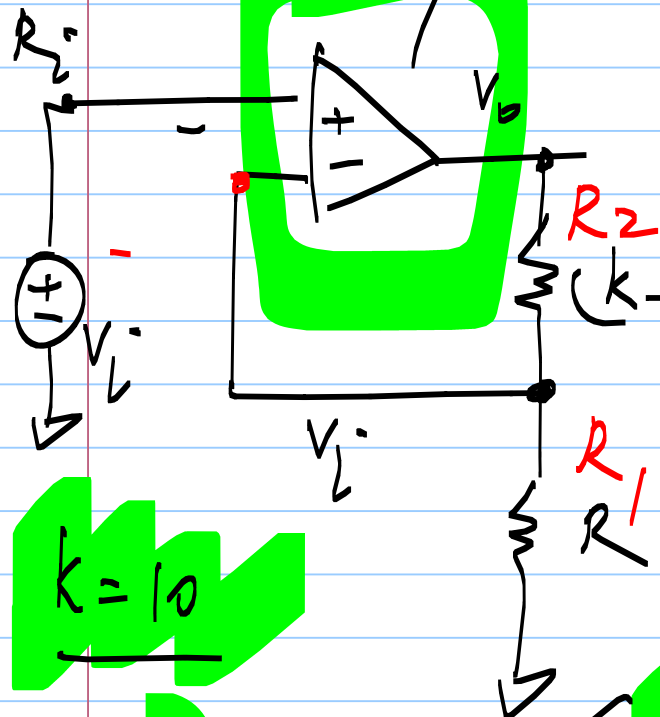
finite A_o & non-zero r_o

large r_i, small r_o will help

$A_o \gg k$

finite A_o

$9.99 < k < 10.01$



$\frac{v_o}{v_i} = \left(1 + \frac{R_2}{R_1}\right)$

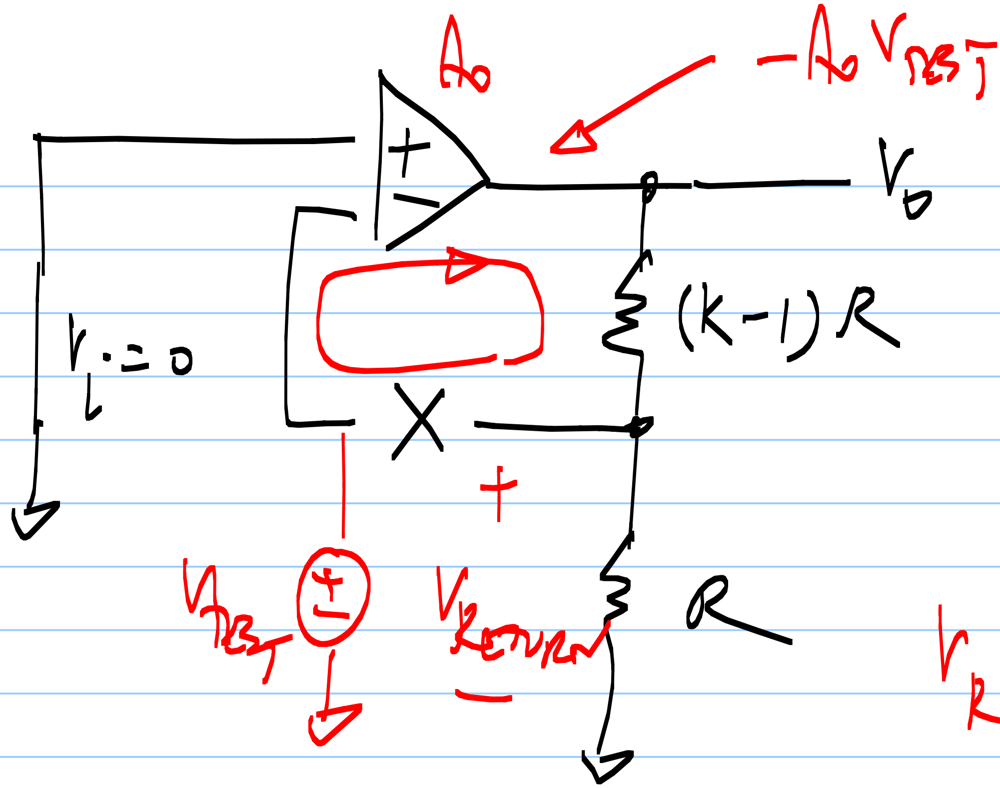
$$\frac{v_o}{v_i} = \frac{A_o k}{k + A_o}$$

Closed loop system $= k \cdot \frac{A_o}{\ldots} = k \cdot \left[\frac{1}{1 + \ldots}\right]$

$k = 10$

9.990

9.999



$$\frac{v_o}{v_i} = K \cdot \frac{1}{1 + }$$

Loop gain:

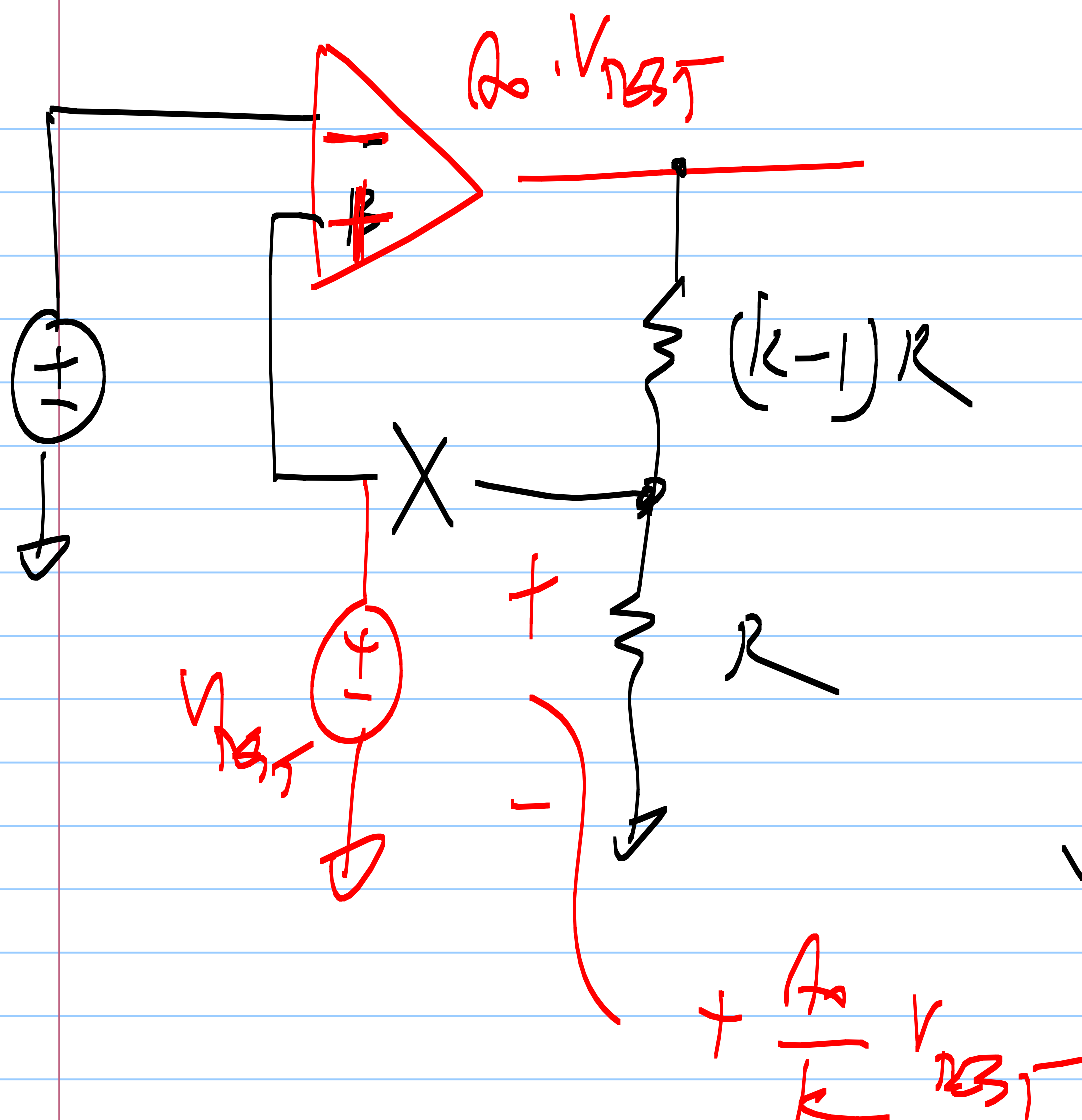
$$v_{return} = - \quad v_{test}$$

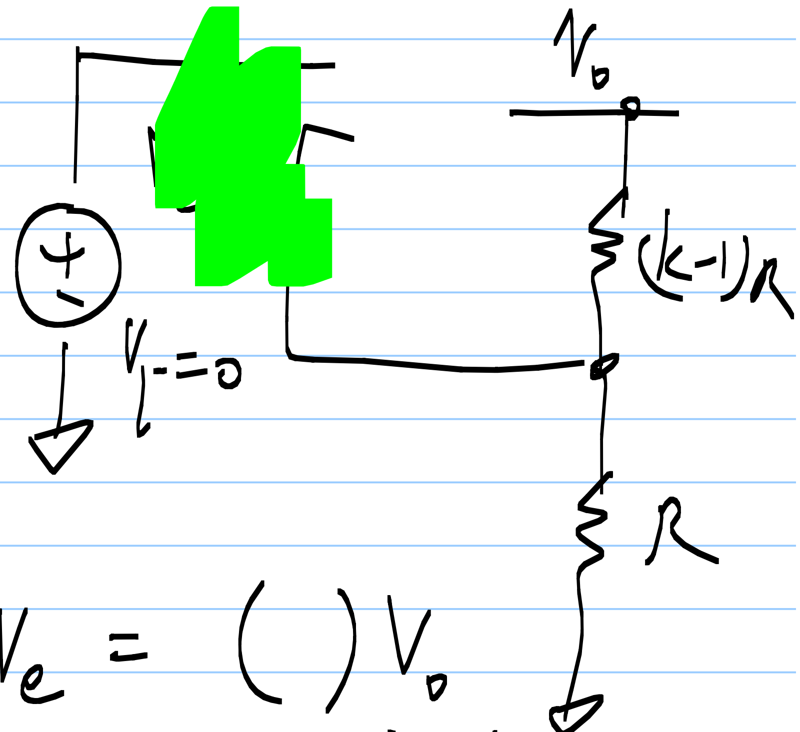
$$= -L \cdot v_{test}$$

Loop gain L

$$\frac{v_o}{v_i} = \underbrace{k}_{\text{Ideal}} \cdot \frac{1}{1 + \frac{k}{A}}$$

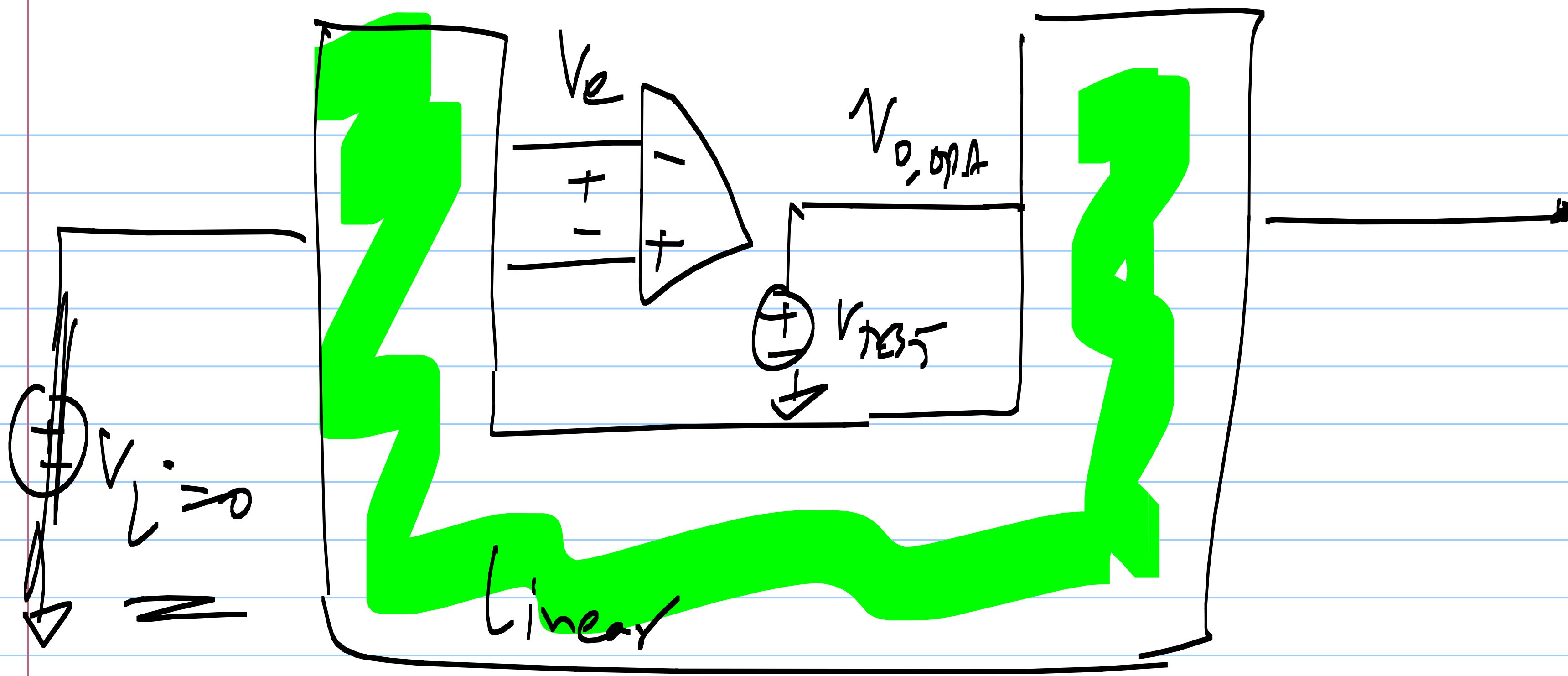
$\frac{k}{A}$ → reciprocal of loop gain





$$V_e = (\ ) V_o$$

has to be -ve



Assume A: +ve

$V_e = (\ )\cdot V_i + (\ )\cdot V_{o,opA}$

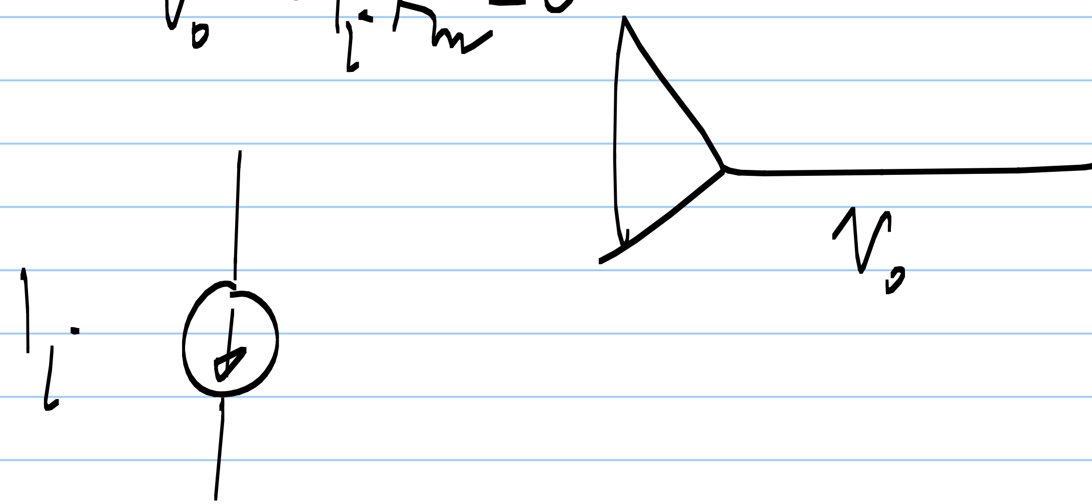
Current controlled voltage source

$V_o = R_m I_i$

R_m: Trans resistance

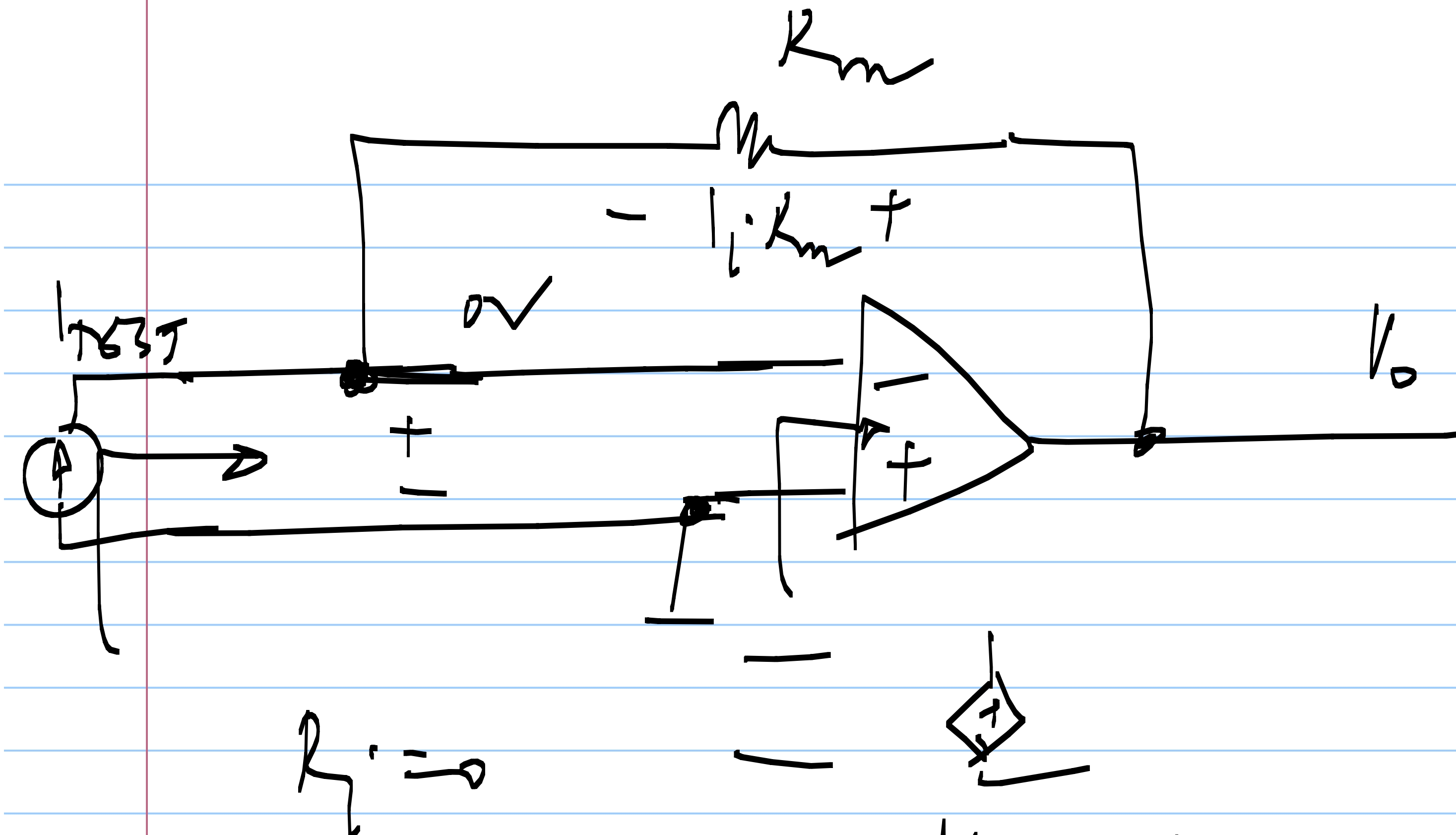
Implement this using -ve fb

$V_o - I_i R_m = 0$



CCVS

Transimpedance amplifier



$R_i = 0$

$V_o - I_i \cdot R_m = V_o$