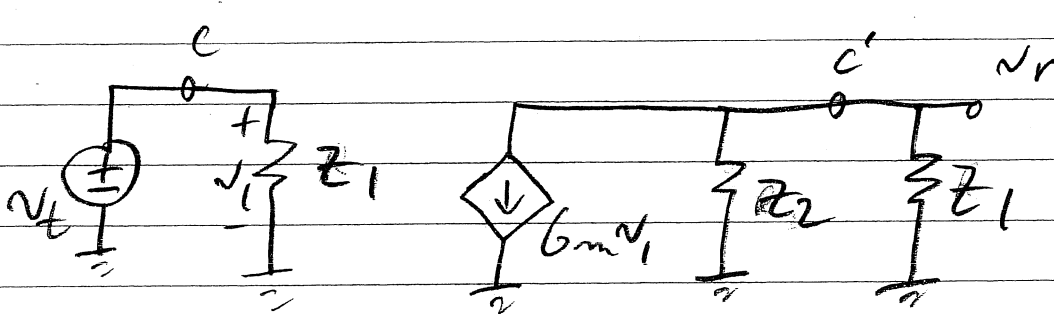
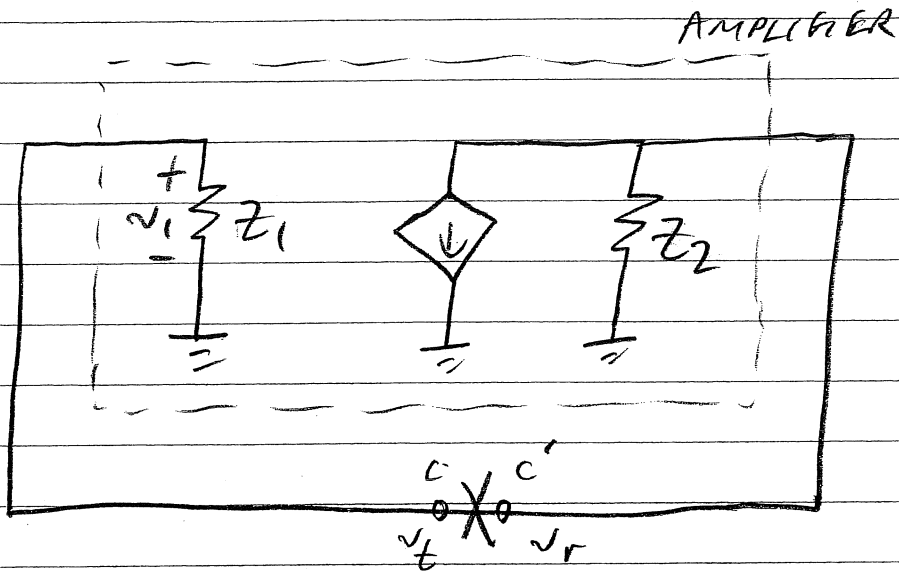


LOOP GAIN (SIMULATION METHODS)

RECALL



NEED TO TERMINATE CUT CORRECTLY

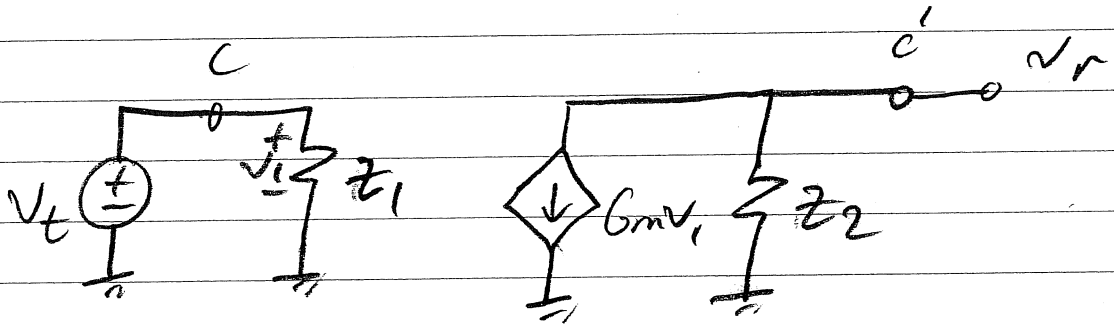
$$L \equiv - \frac{v_r}{v_t} = G_m (z_1 || z_2)$$

$$L = G_m \left(\frac{z_1 z_2}{z_1 + z_2} \right) \textcircled{1}$$

LOOP GAIN

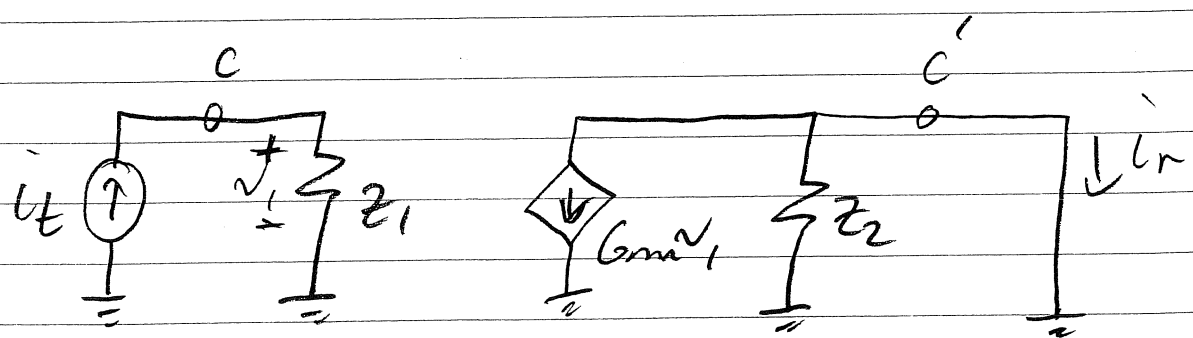
ALTERNATIVE METHOD #1

DEFINE T_{oc} AS LOOP GAIN
WITH "CUT" OPEN CIRCUIT



$$T_{oc} \equiv -\frac{v_r}{v_t} = G_m z_2 \quad (2)$$

DEFINE T_{sc} AS CURRENT LOOP GAIN
WITH "CUT" SHORT CIRCUIT



$$T_{sc} \equiv -\frac{i_r}{i_t} = G_m z_1 \quad (3)$$

CAN COMBINE ① ② & ③

TO FIND

$$\frac{1}{L} = \frac{1}{T_{OC}} + \frac{1}{T_{SC}}$$

OR

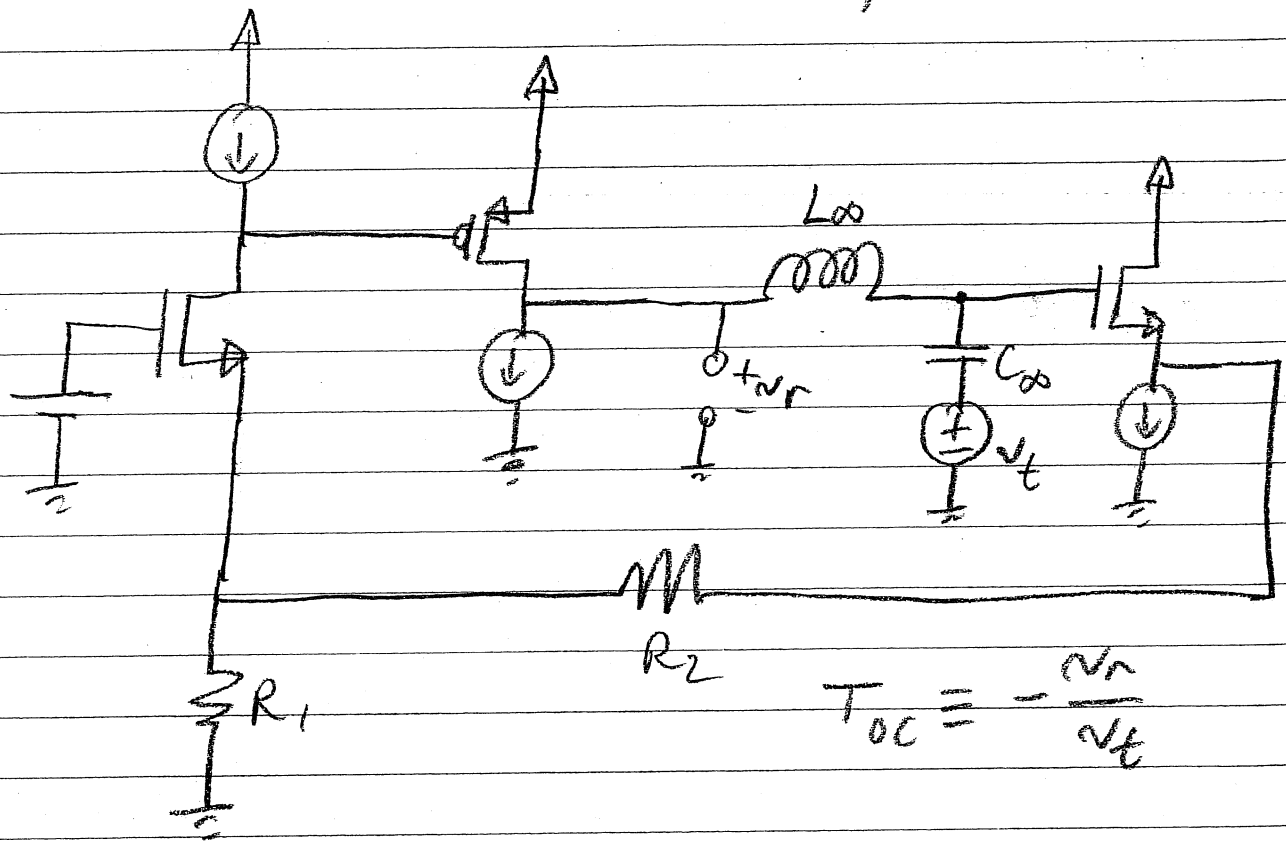
$$L = \left(\frac{1}{T_{OC}} + \frac{1}{T_{SC}} \right)^{-1}$$

- CAN USE THIS APPROACH WHEN
SIMULATING A CIRCUIT.

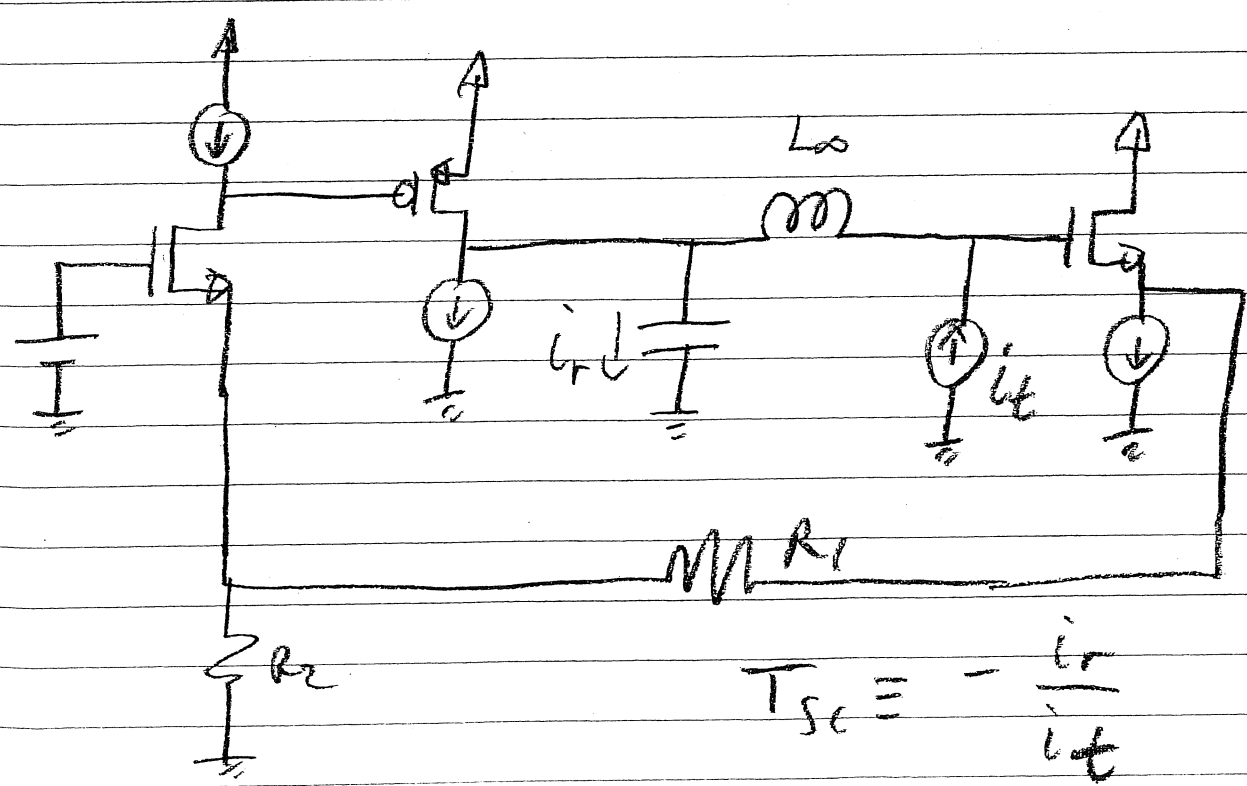
- CAN USE LARGE INDUCTORS & CAPACITORS
TO BREAK LOOP WITHOUT AFFECTING
BIAS CONDITIONS.

EXAMPLE

L_{∞}, C_{∞} LARGE



$$T_{OC} \equiv -\frac{v_o}{v_t}$$



$$T_{SC} \equiv -\frac{i_o}{i_t}$$

LOOP GAIN

ALTERNATE METHOD #2

USE REPLICA CIRCUIT TO INCLUDE LOADING EFFECT.

