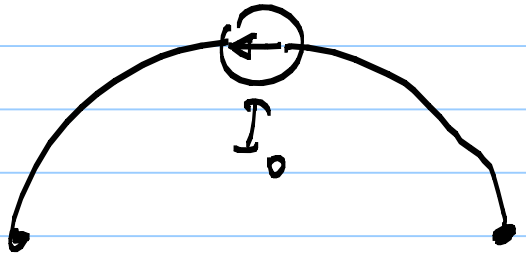
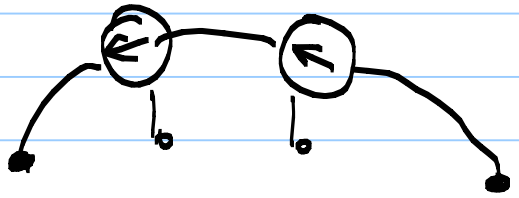
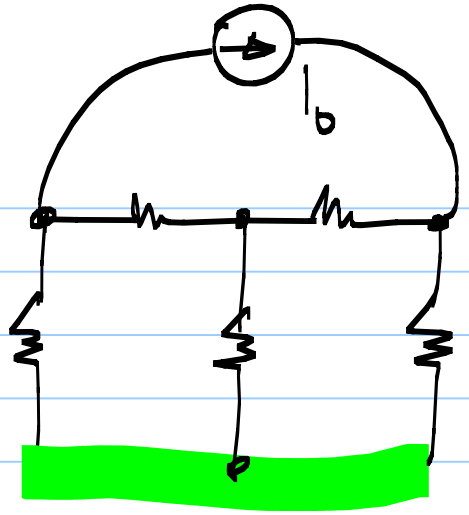
EC 1010: Lecture 11

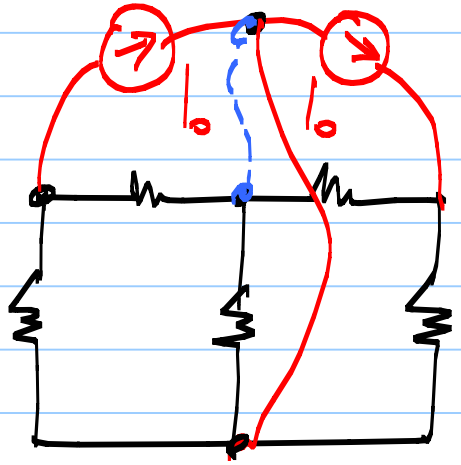
Splitting a current source



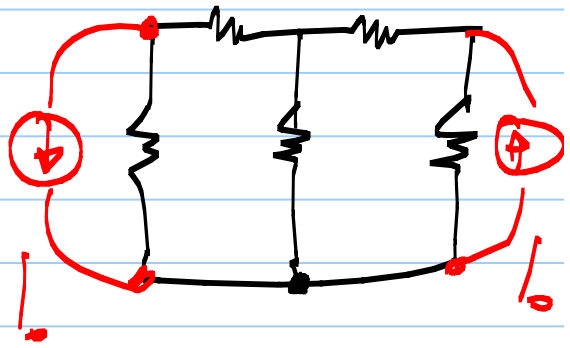
$\equiv$





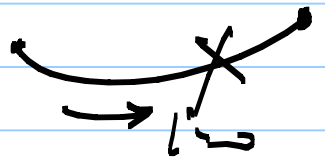


$\equiv$

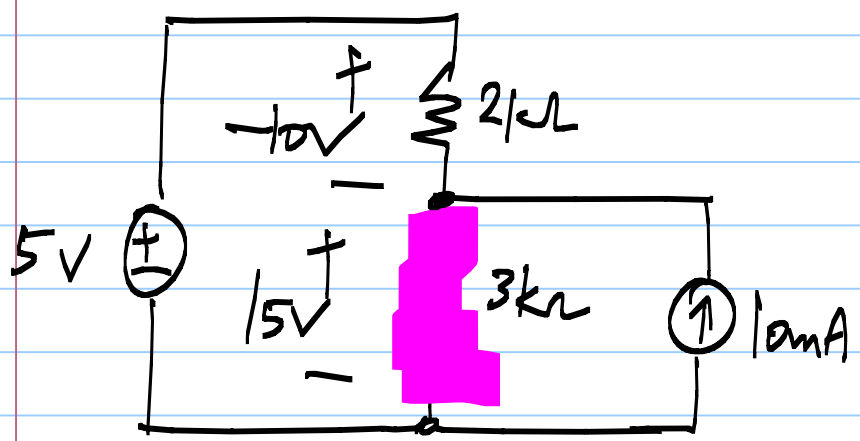


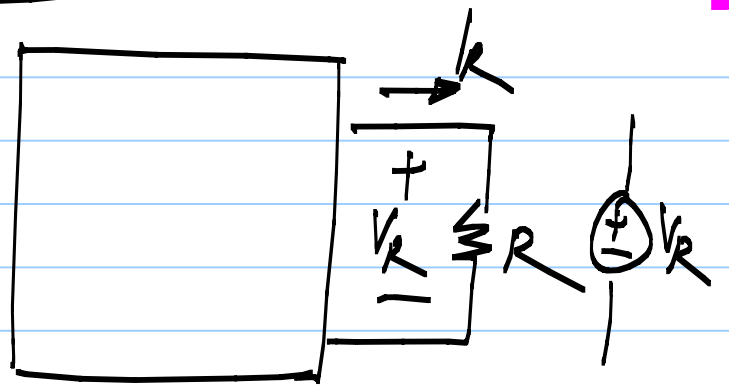
* If two nodes are at exactly the same voltage, the two nodes can be connected without affecting the circuit solution (branch voltages & currents)

* If a branch has zero current, then, that branch (wire) can be open circuited (removed) without affecting the circuit solution

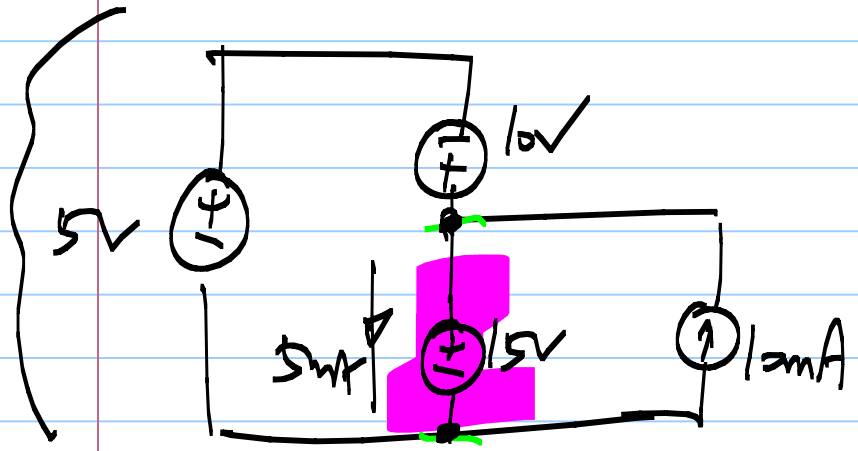


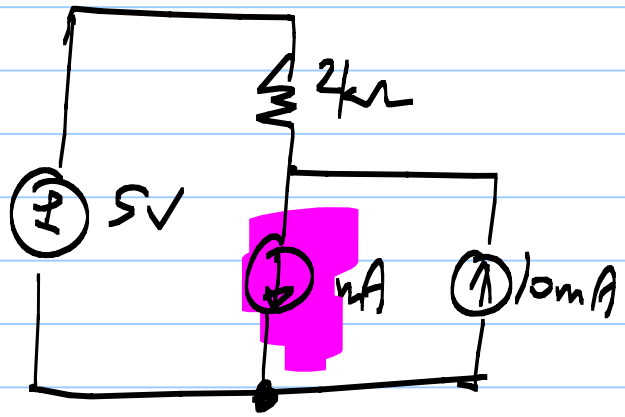
Substitution theorem

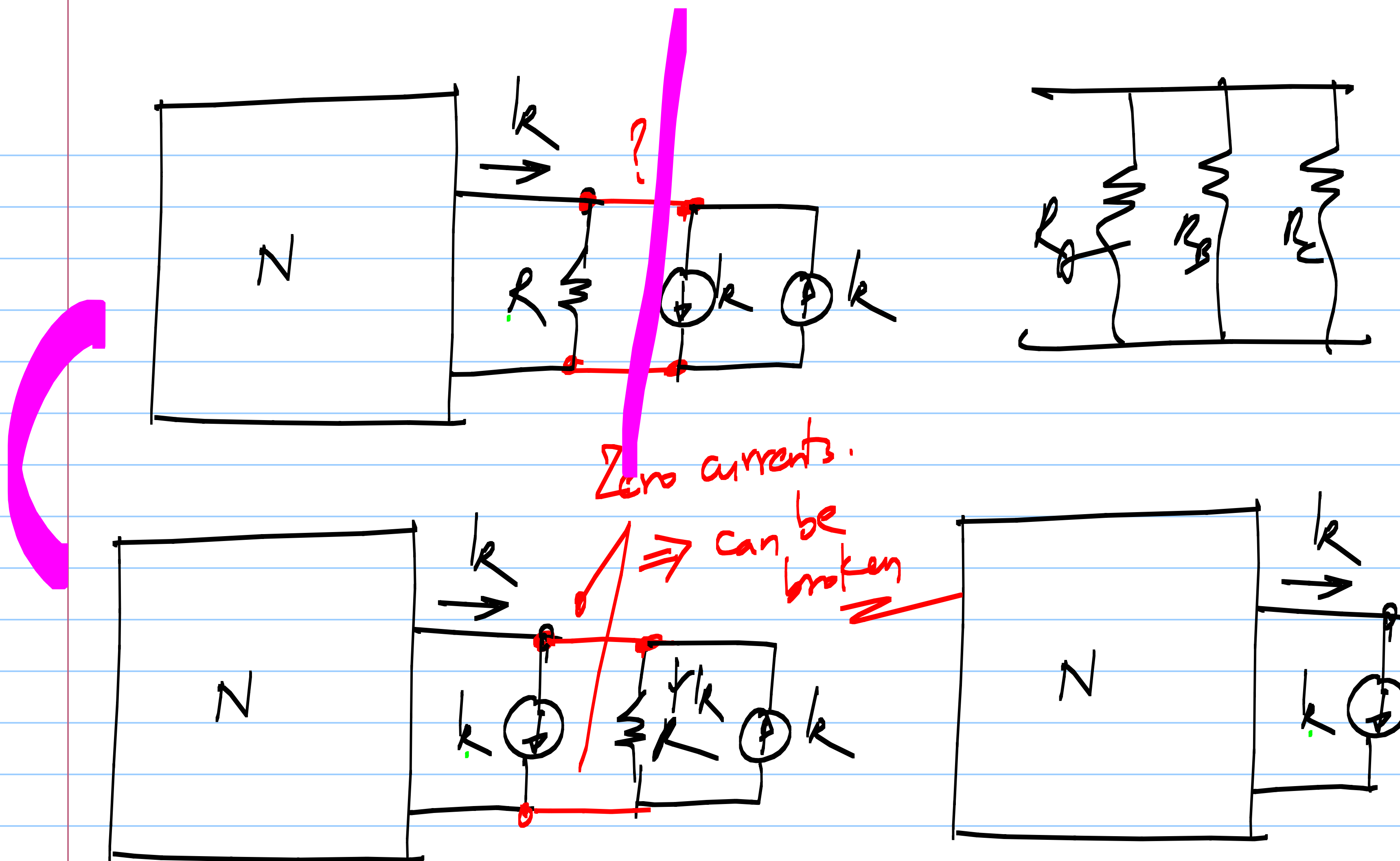


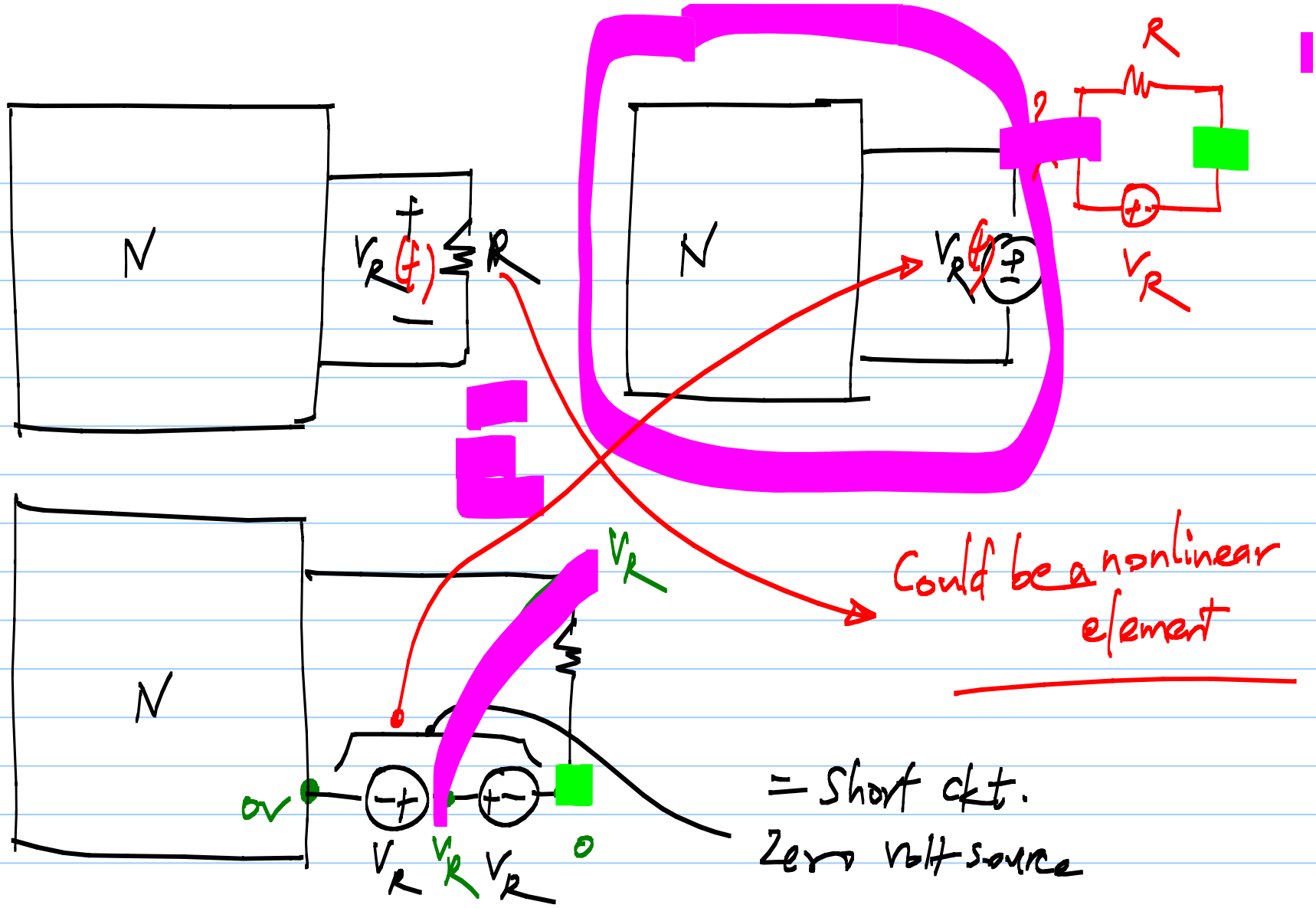


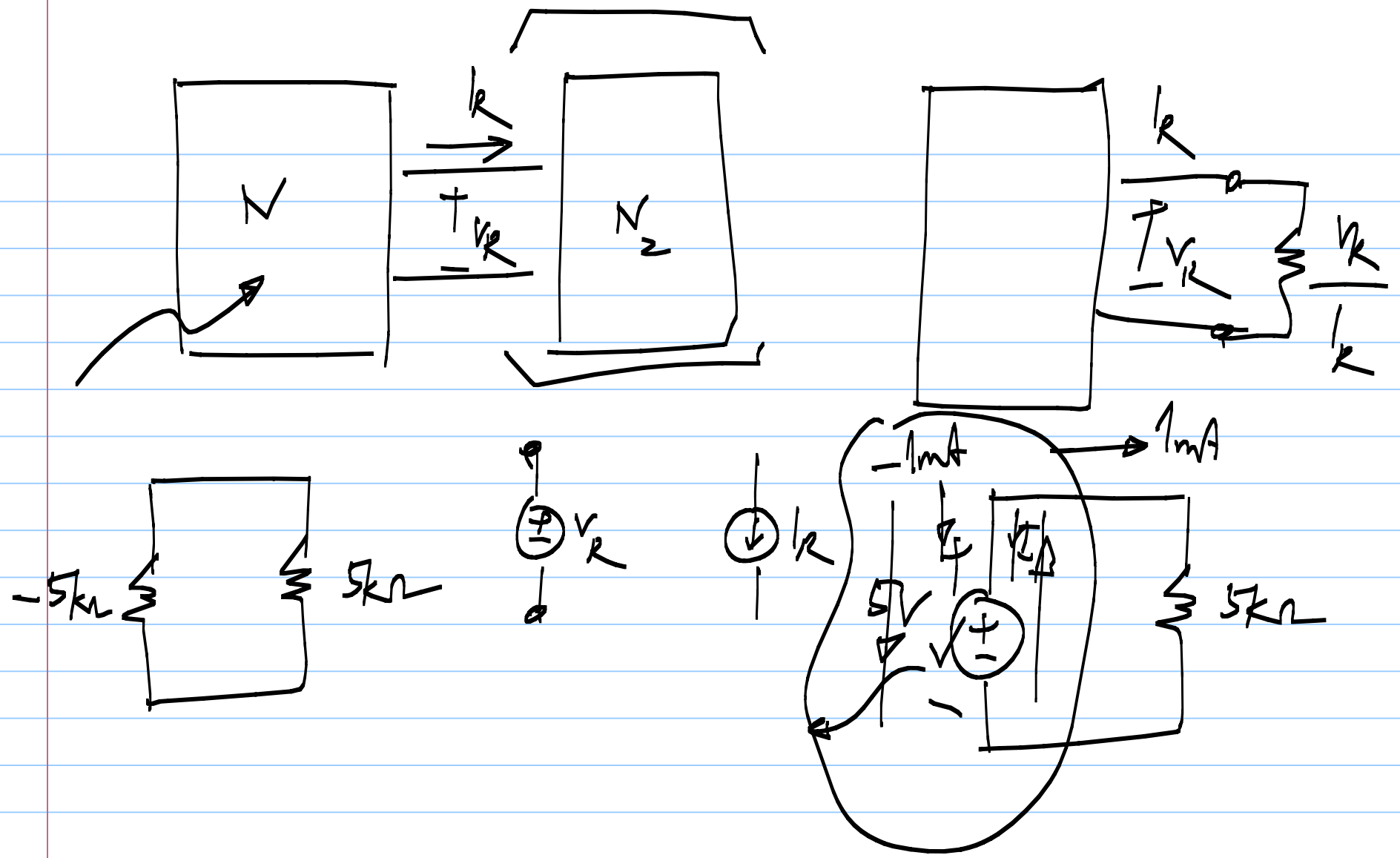
$$I_k = \frac{V_k}{R}$$

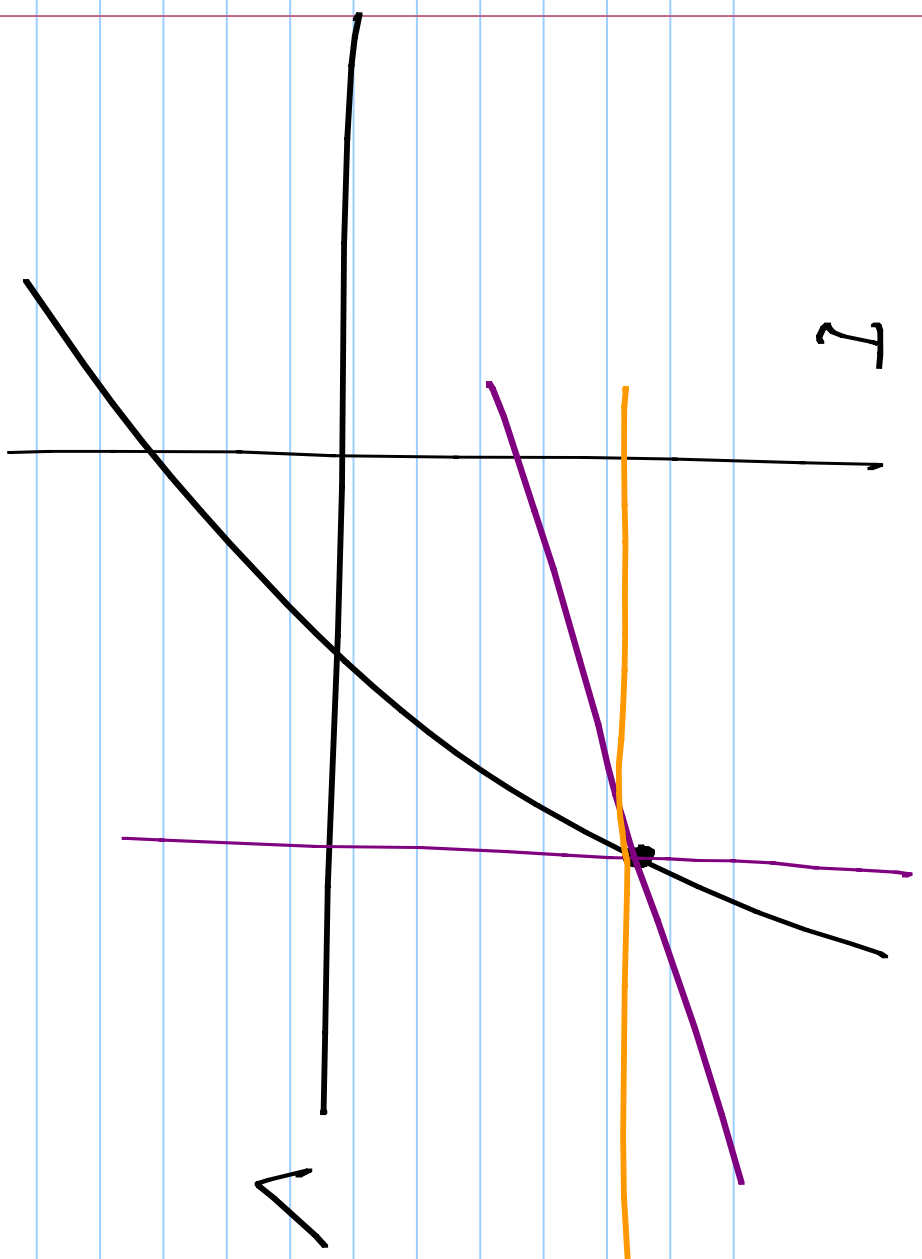


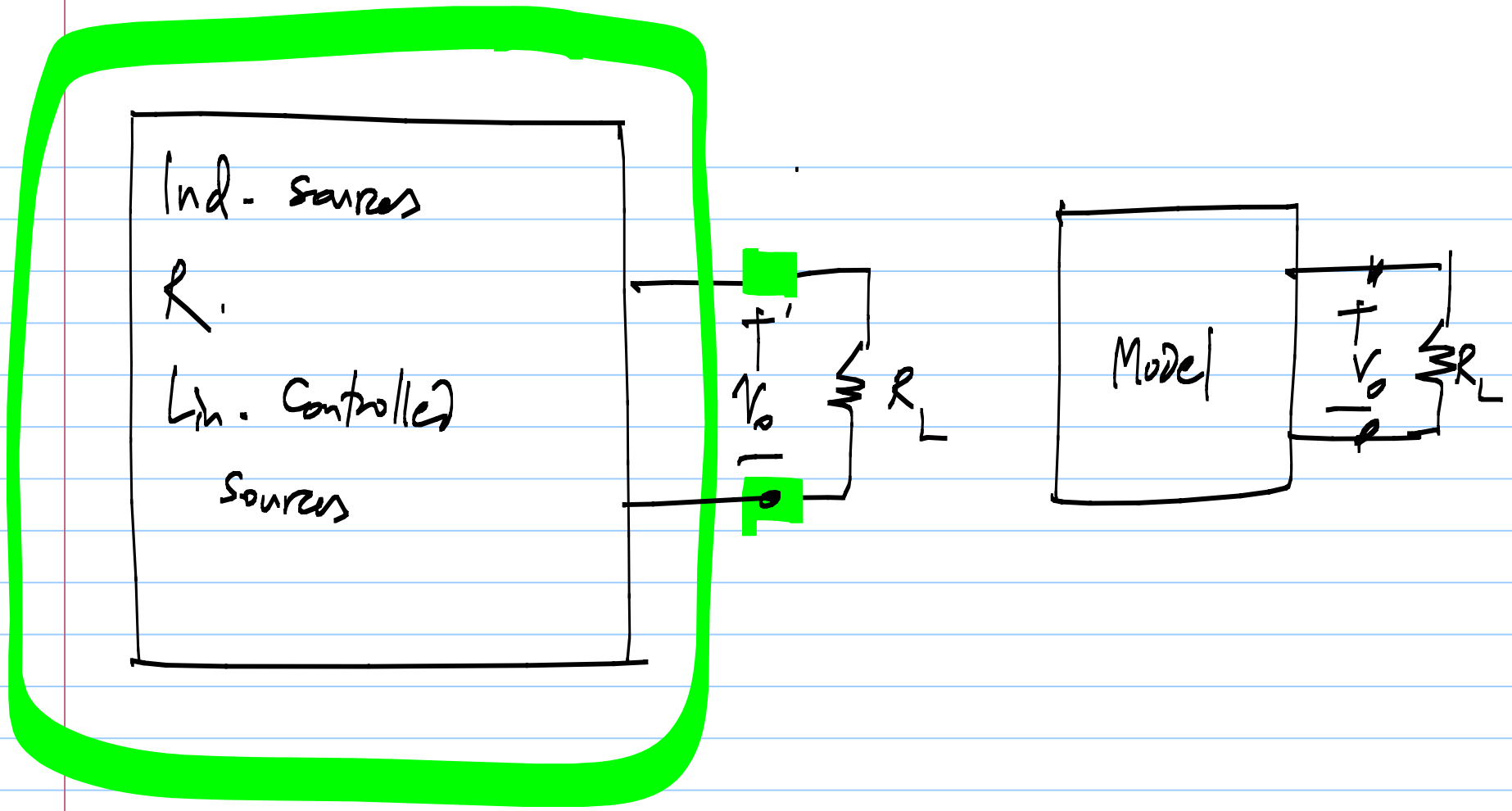


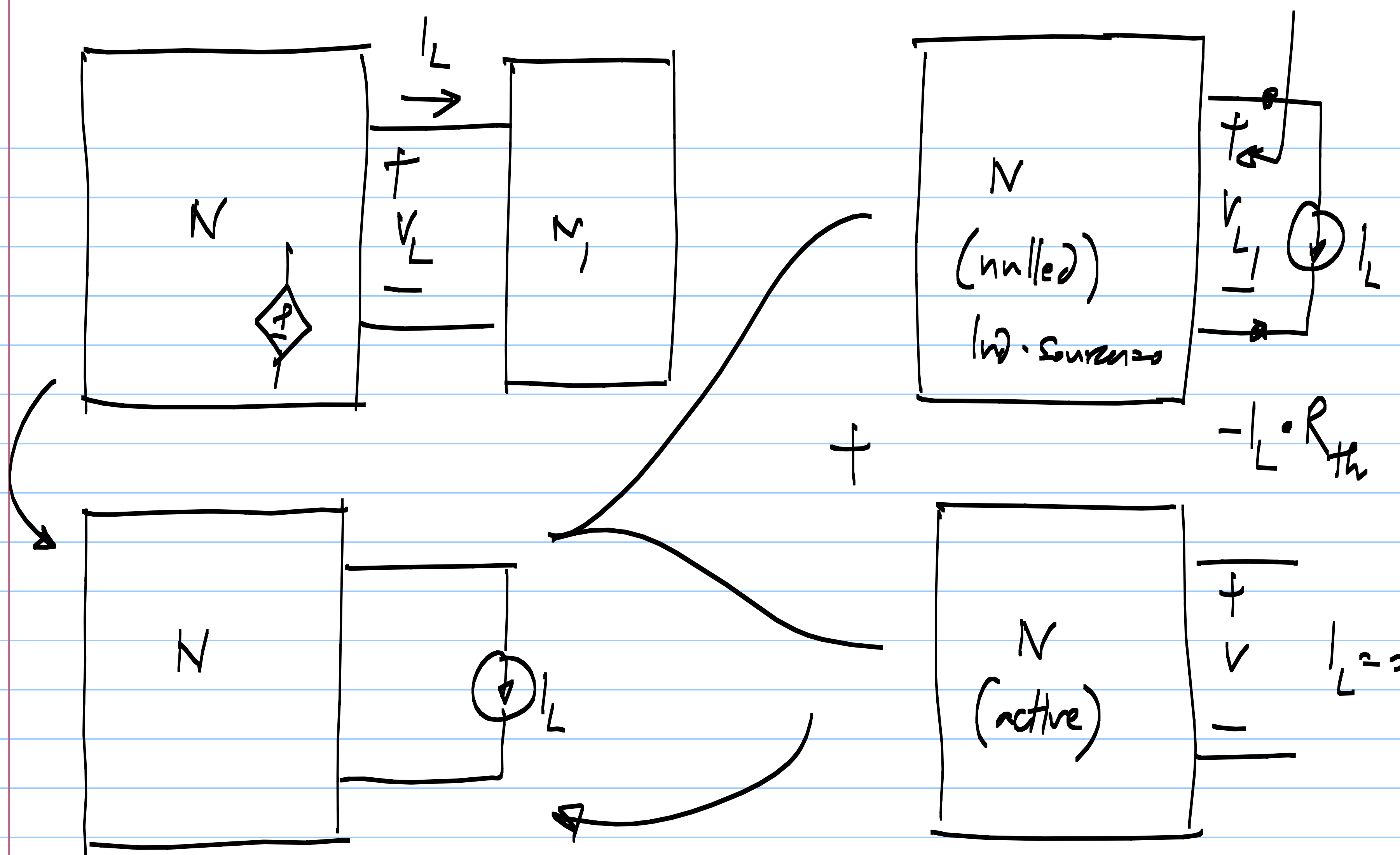

N
N
N
Zero currents.
⇒ can be broken
?


N
$v_R(t)$
R
+
−
N
$v_R(t)$
2
R
v_R
N
v_R
0V
v_R
v_R
v_R
0
Could be a nonlinear element
= Short ckt.
Zero volt source


N
i_R
$+ \; v_R \; -$
N_2
i_R
$+ \; v_R \; -$
R_k
i_R
$-5k\Omega$
$5k\Omega$
v_R
i_R
$-1mA$
$1mA$
$5V$
$+ \; v \; -$
$5k\Omega$


r
V


Ind. Sources
R.
Lin. Controlled
Sources
+
V_o
−
R_L
Model
+
V_o
−
R_L


N
I_L
V_L
N_1
N
I_L
N
(nulled)
Ind. Source = 0
V_L
I_L
$-I_L \cdot R_{th}$
+
N
(active)
V
$I_L = 0$