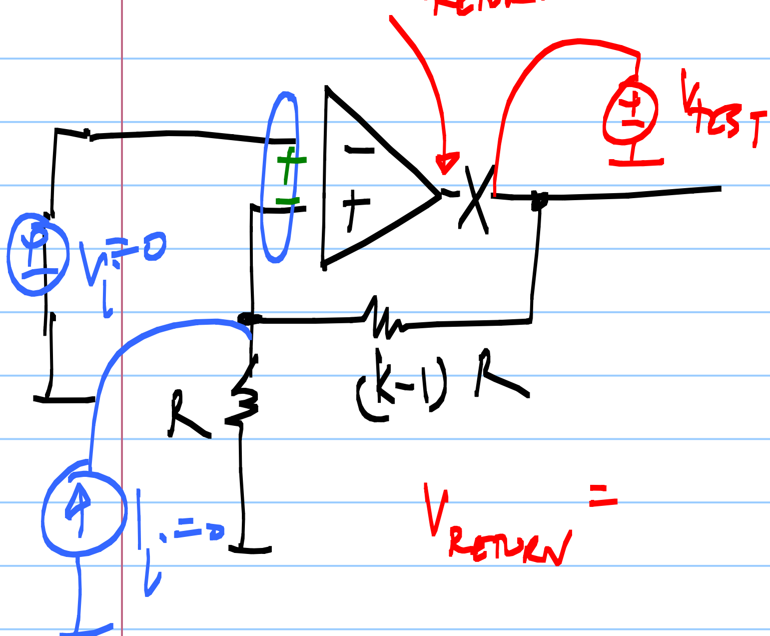
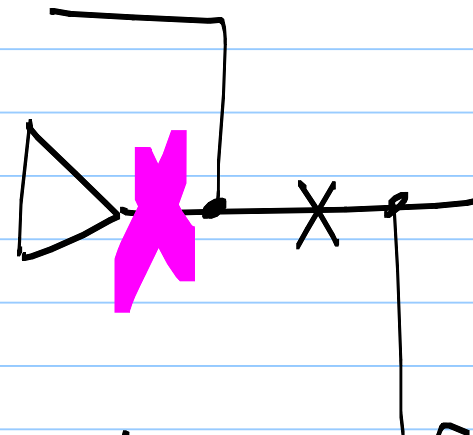
EC 1010: Lecture 22



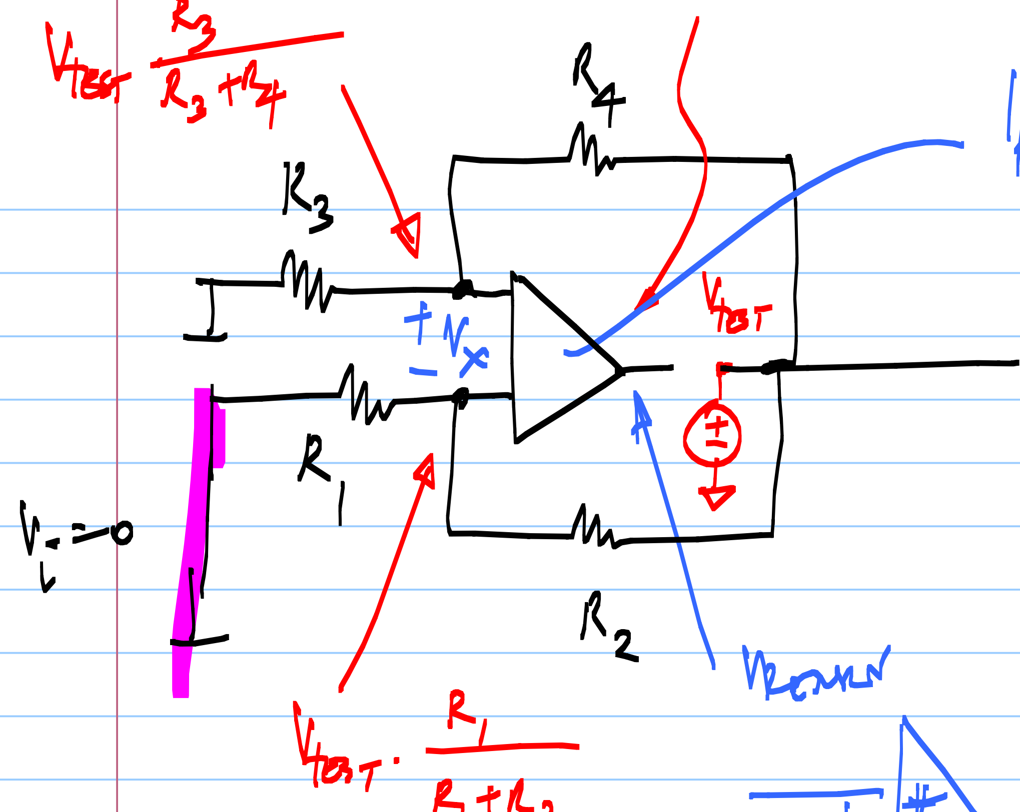
$V_{RETURN} = \left(-\frac{A_0}{k} \right) \cdot V_{TEST}$

$\frac{A_0}{k} > 0$

If this factor < 0

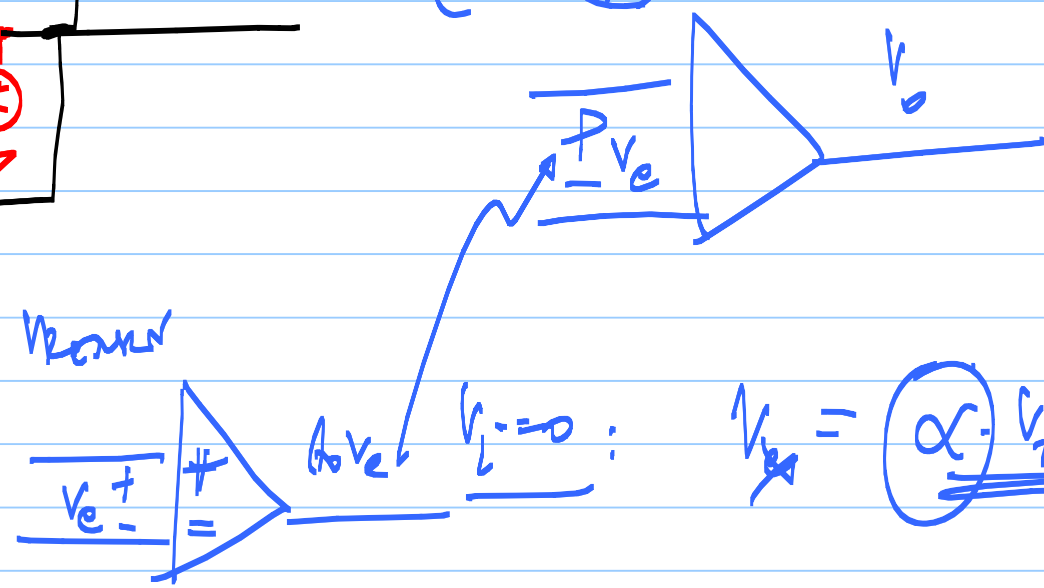


opamp is in -ve feedback



if $\frac{R_3}{R_4} > \frac{R_1}{R_2}$

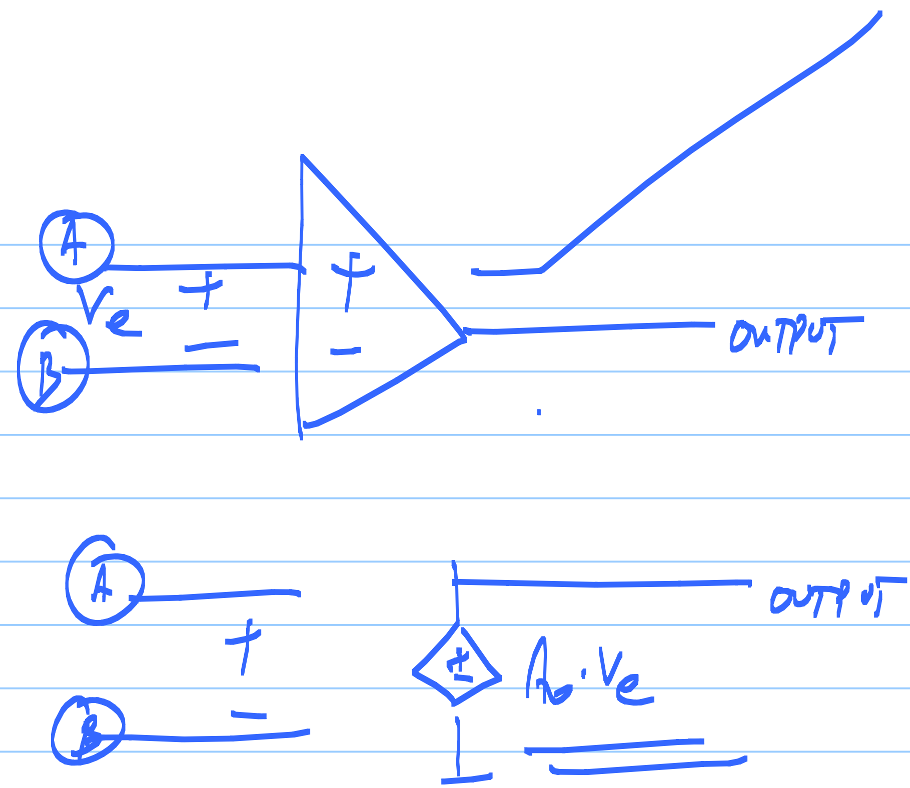
$-A_o \left(V_{TEST} \left(\frac{R_3}{R_3+R_4} - \frac{R_1}{R_1+R_2} \right) \right)$



$V_A > V_B$ if $\frac{R_3}{R_4} > \frac{R_1}{R_2}$

$V_i = 0$: $V_e = \alpha \cdot V_{TEST}$

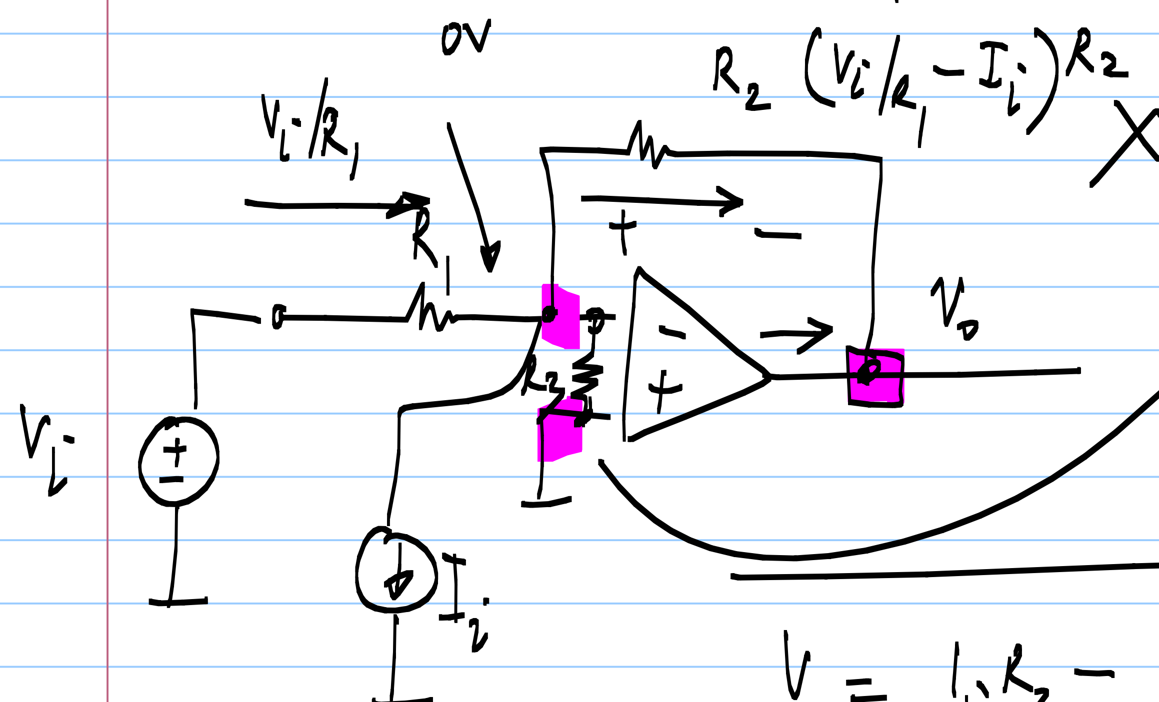
$V_i \neq 0$: $V_e = \beta V_i + \alpha V_{TEST}$



A
B
Ve
+
−
OUTPUT
A
B
+
−
±
Ao·Ve
OUTPUT

Ideal

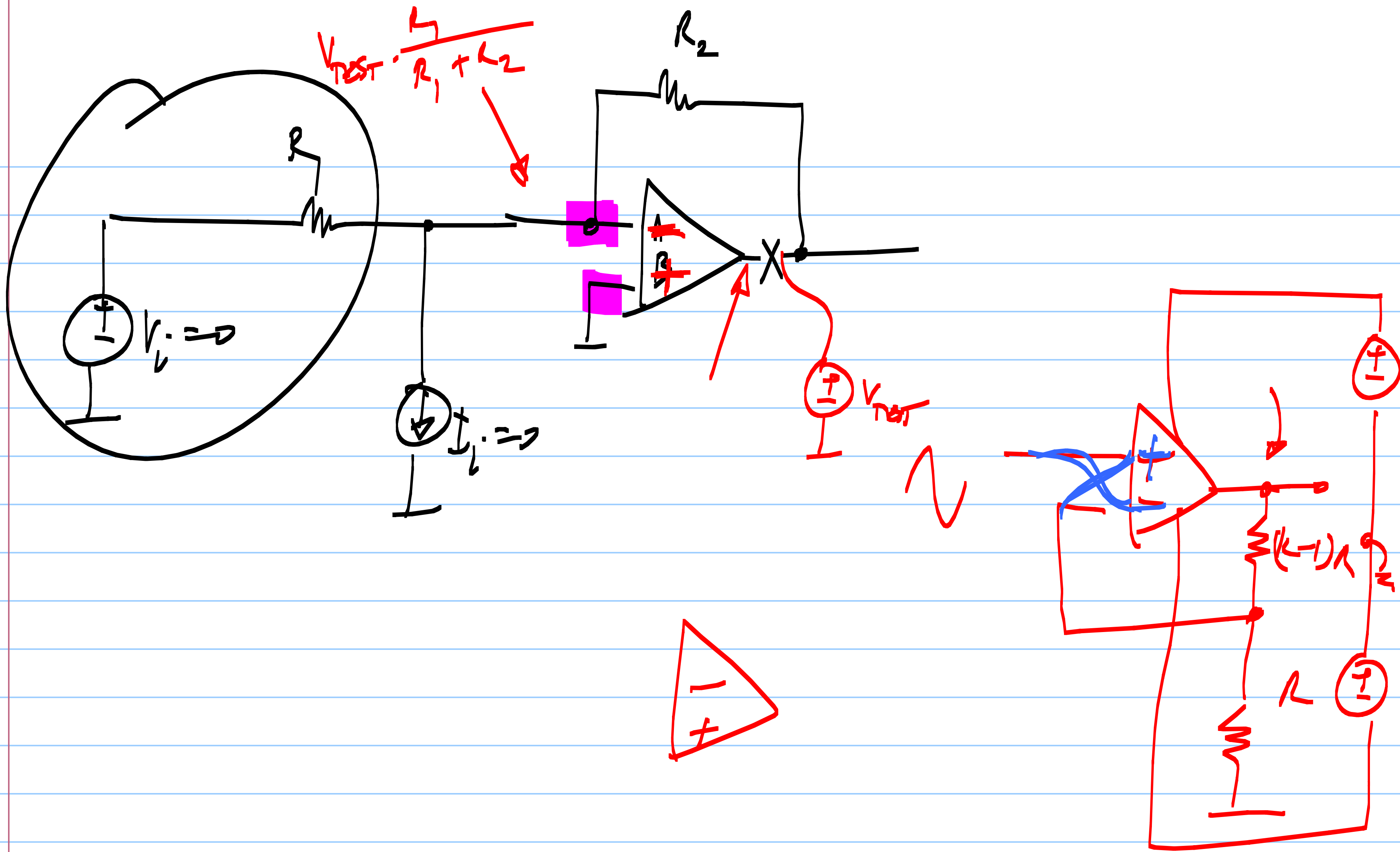
Analysis of circuits with opamps in negative feedback



X KCL @ opamp output

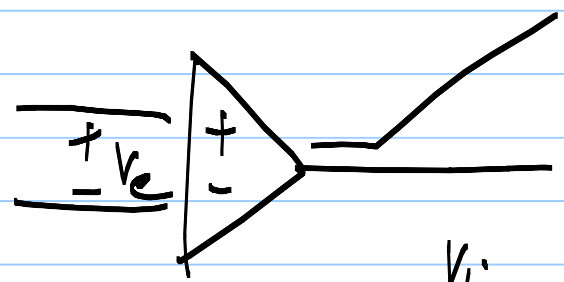
Virtual short at opamp inputs

$$V_o = I_i R_2 - V_i \frac{R_2}{R_1}$$



$V_{TEST} \cdot \frac{R_1}{R_1 + R_2}$
R_2
R
$V_i := 0$
$I_i := 0$
V_{TEST}
$(k-1)r$
R

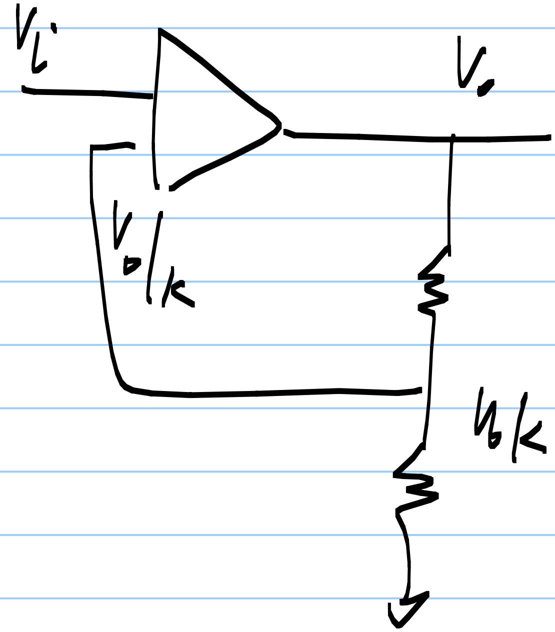
CCVS : using an opamp



VCVS: $V_o = kV_i$

$\frac{V_o}{k} = V_i$

$V_i - \frac{V_o}{k}$



$V_o = I_i \cdot R_m$

$V_o - I_i \cdot R_m = 0$