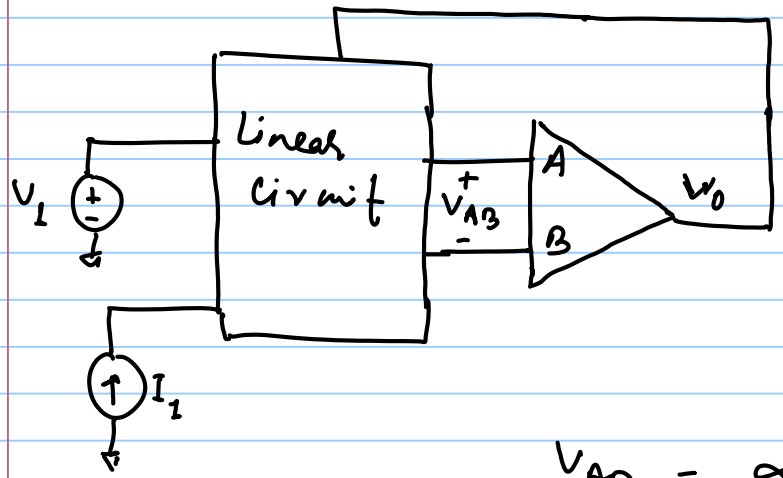
EE2019 Analog Systems & Lab

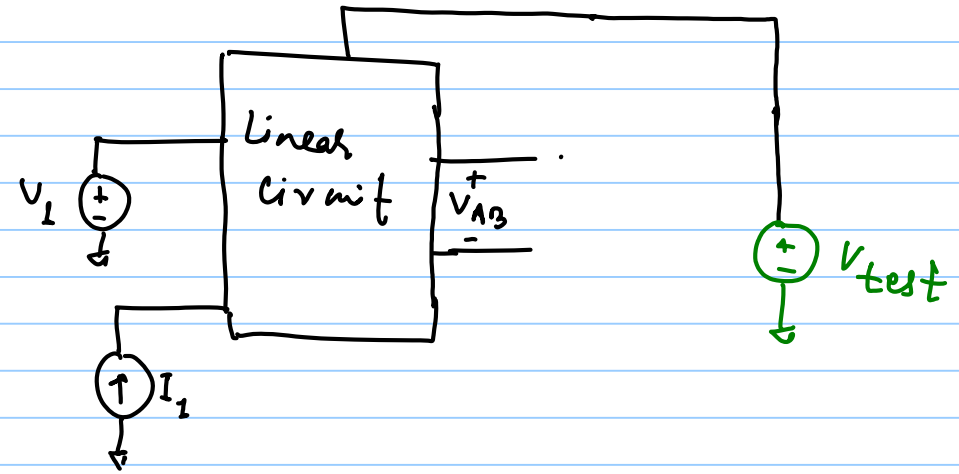
Note Title 2/5/2020

How to find sign of op-amp for negative feedback



$$V_{AB} = \alpha V_1 + \beta I_1 + K V_0$$

$= 0$ as we are only interested in feedback



$$V_{AB} = K V_{test}$$

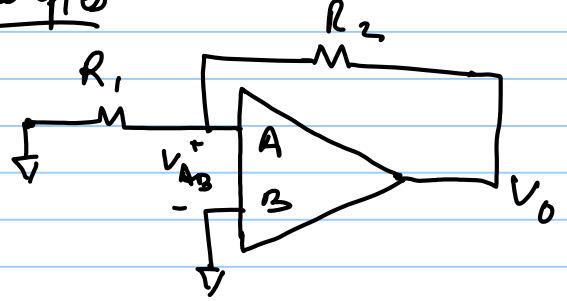
for negative feedback

$$V_{AB} = -K V_{Test}$$

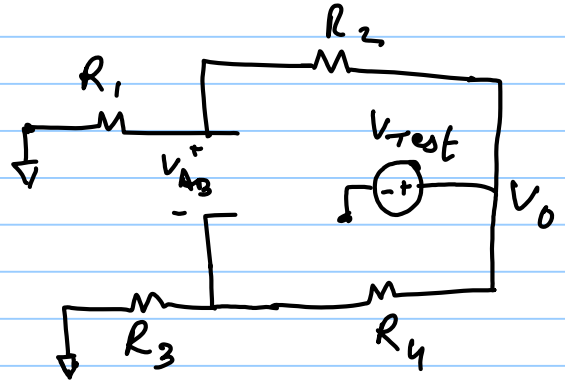
$\Rightarrow$ if $K > 0$, $A = -$ & $B = +$

if $K<0$, $A = +$ & $B = -$

Examples



$A = -$ & $B = +$



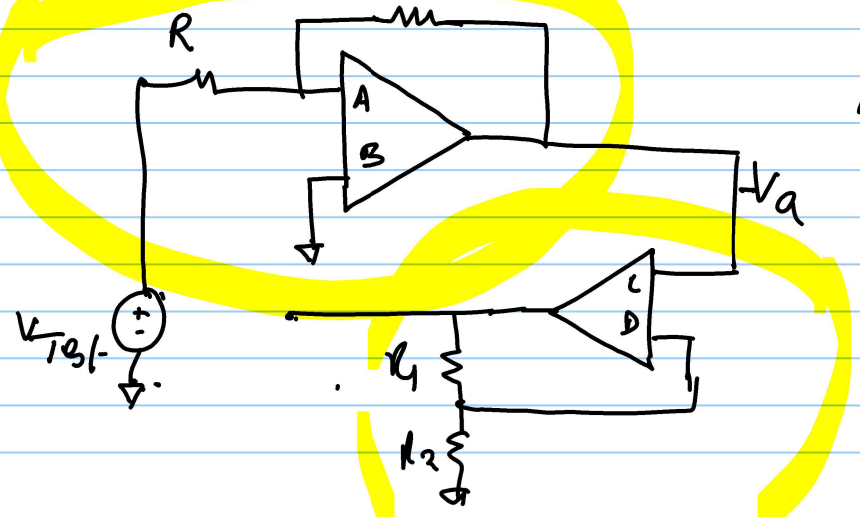
$$V_A = \frac{R_1}{R_1+R_2} \cdot V_{Test} = K_1 \cdot V_{Test}$$

$$V_B = \frac{R_3}{R_3+R_4} V_{Test} = K_2 V_{Test}$$

$$V_{AB} = (k_1 - k_2)\, V_{Test}$$

if $k_1 > k_2$, $A = -$, $B = +$

if $k_1 < k_2$, $A = +$, $B = -$



$A = -$, $B = +$

$C = +$, $D = -$

Procedure for finding Signs of op-amp

(1) Make all independent sources = 0

Voltage source → short

Current source → open

(2) Remove op-amp

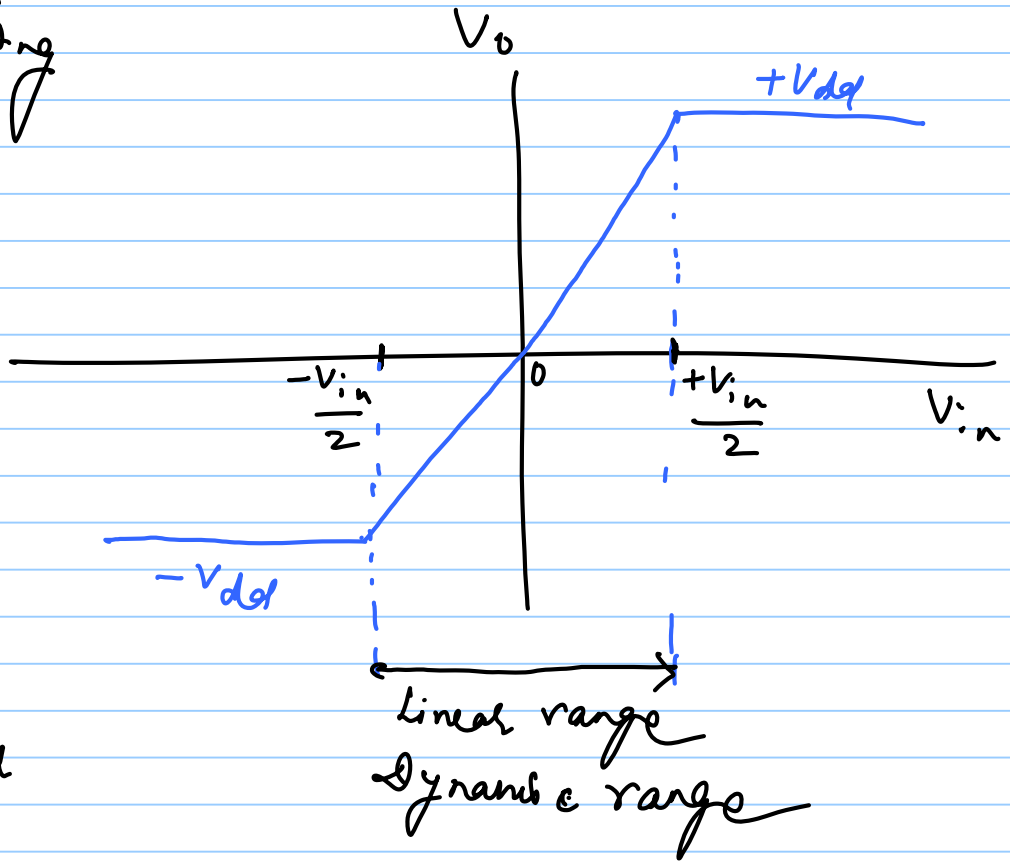
(3) Apply V_{Test} at output of op-amp

(4) Find $V_{AB} = K V_{Test}$

if $K < 0$, $A = +$, $B = -$

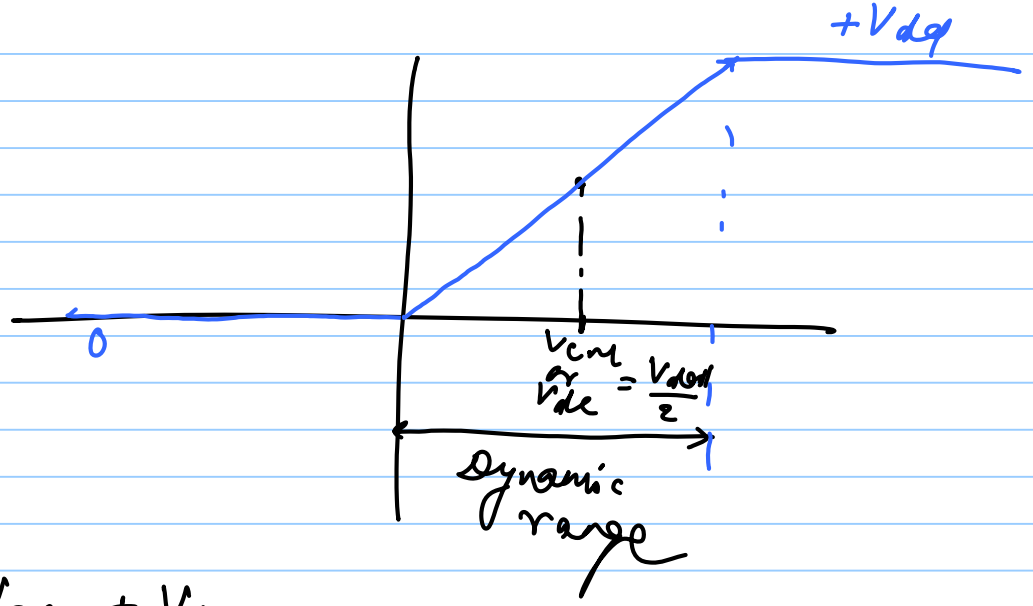
if $K > 0$, $A = -$, $B = +$

Signal Biasing

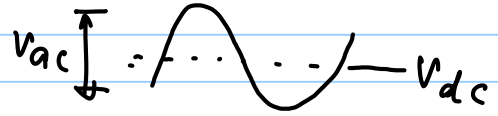


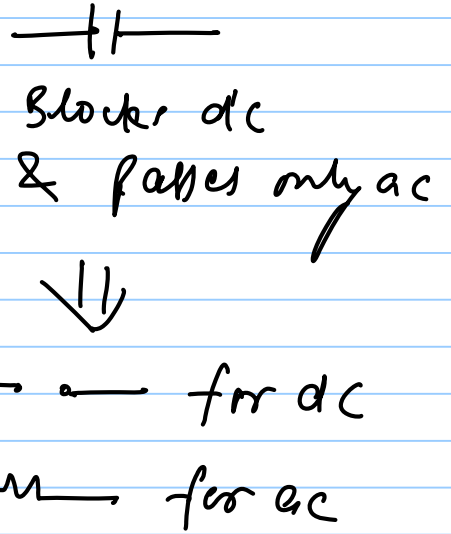
$V_o = K \cdot V_{in}$

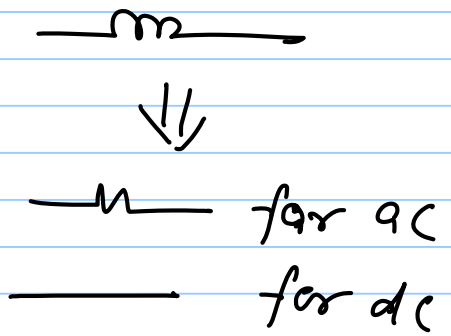
$|V_o| < V_{dd}$



$V_{in} = V_{ac} + V_{dc}$




Blocks dc
& passes only ac
for dc
for ac


for ac
for dc