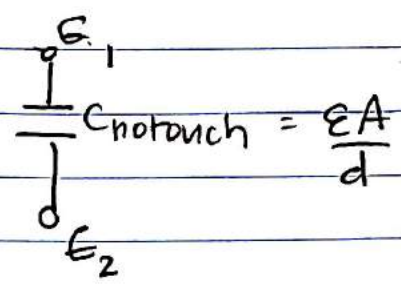
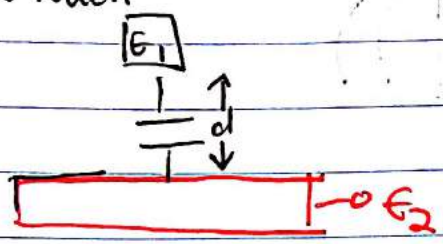
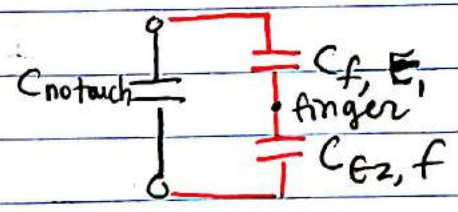
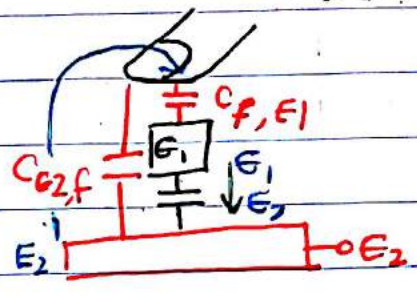


No touch

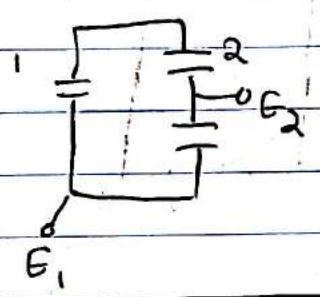


With touch

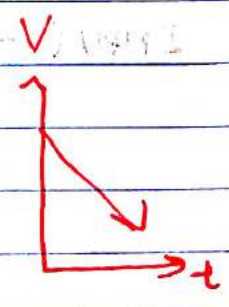
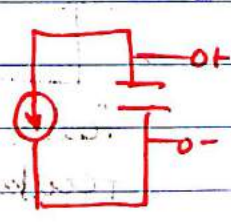
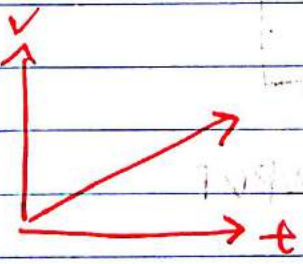
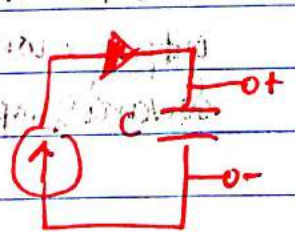
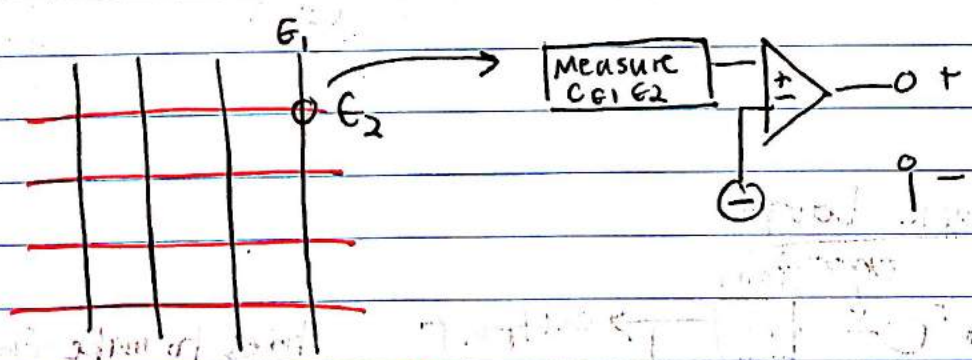


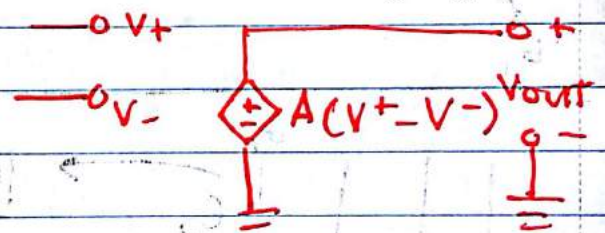
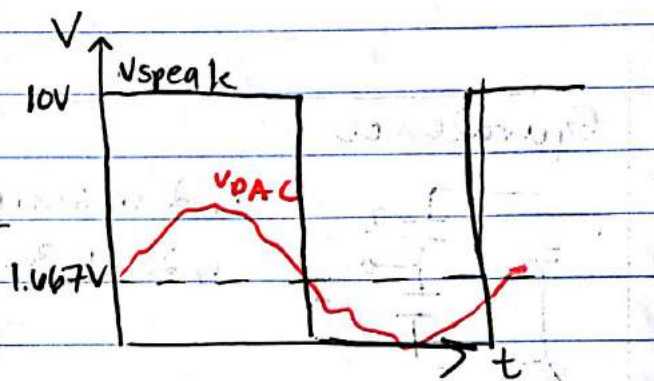
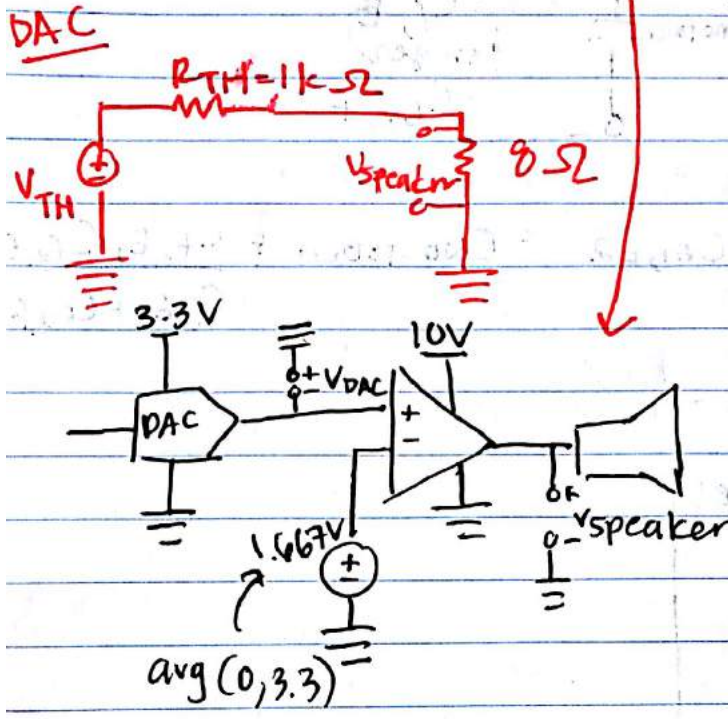
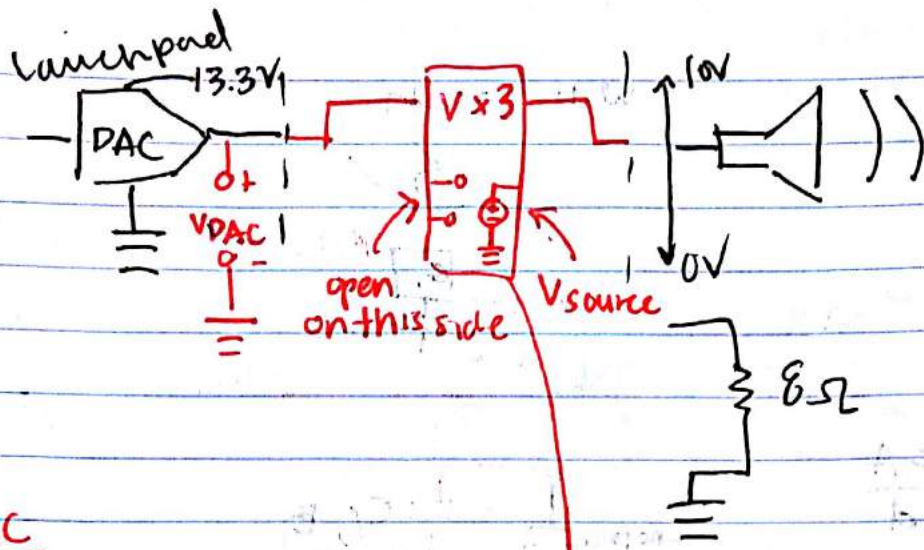
$$C_{E1, E2} = C_{NO-TOUCH} + \frac{C_{f, E1} C_{E2, f}}{C_{f, E1} + C_{E2, f}}$$

Equivalence:

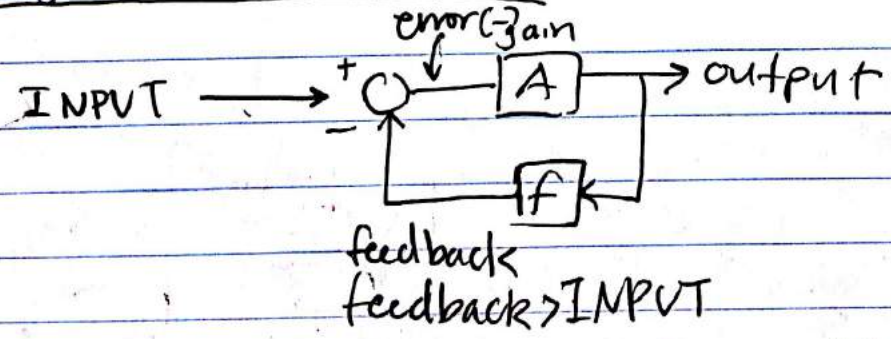


1, 2 in series  
1, 2 || 3

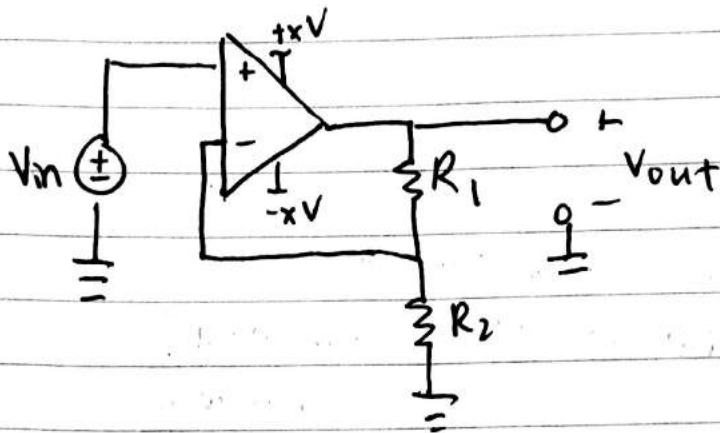




### Negative Feedback Loop

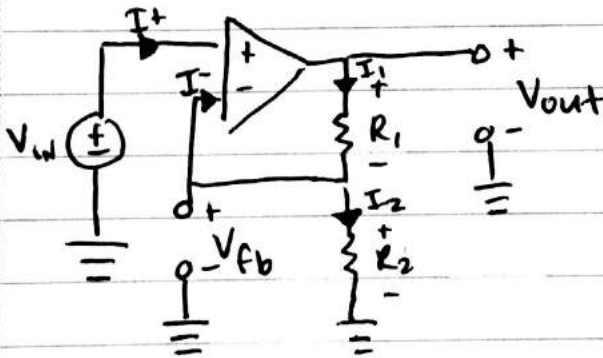
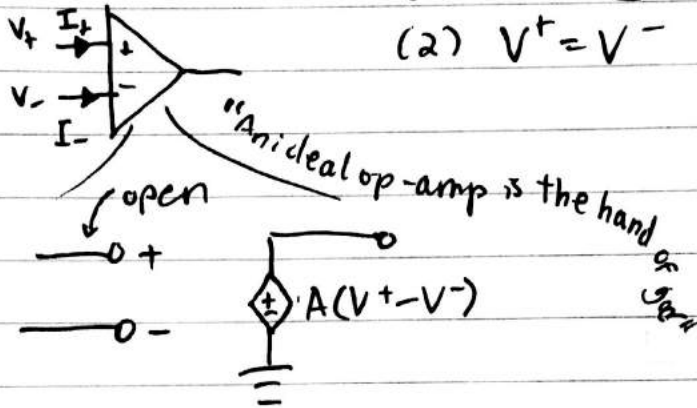


- tries to make the output move towards input



Golden Rules:

- (1)  $I^+ = I^- = 0$ . always true
- (2)  $V^+ = V^-$  (only true w/ neg. feedback)



(1)  $I^+ = I^- = 0A$

KCL

(2)  $I_1 = I_2$

(3)  $V^+ = V^-$

$V_{in} = V_{fb}$

(4)  $V_{fb} = I_2 R_2$  (Ohm's)

$$I_2 = \frac{V_{fb}}{R_2}$$

(5)  $V_{out} = V_{fb} + I_1 R_1$

$$= V_{in} + \frac{V_{in} R_1}{R_2}$$

to achieve gain of 3,  $R_1/R_2 = 2$