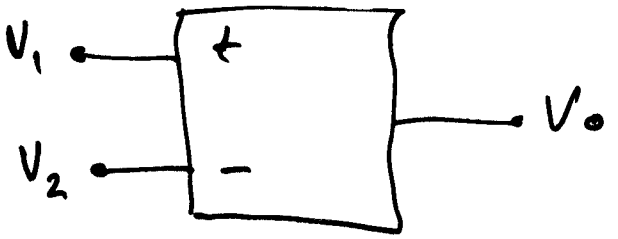
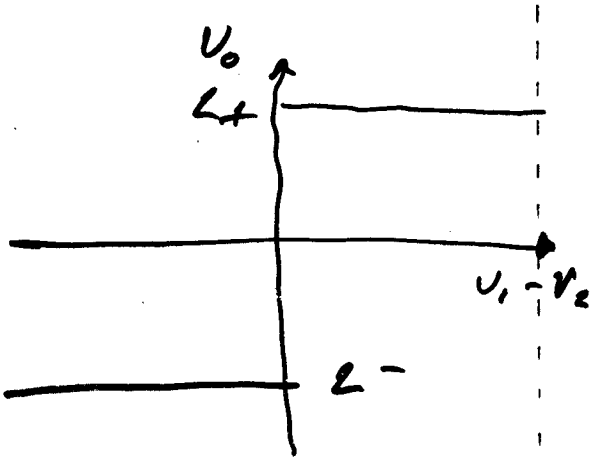
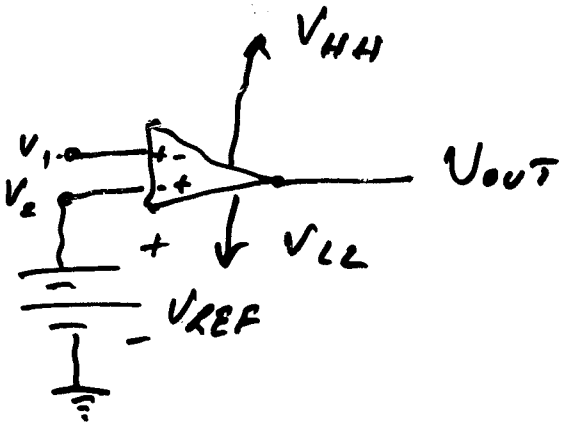
COMPARATORS:

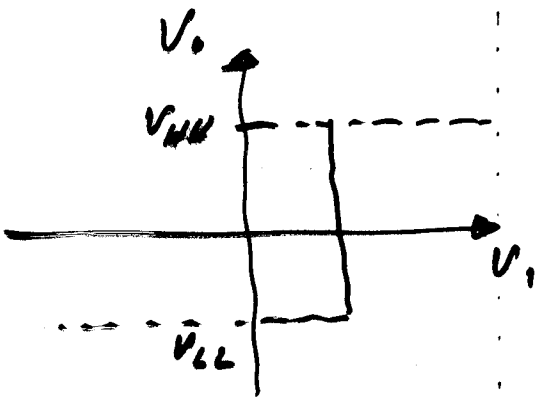




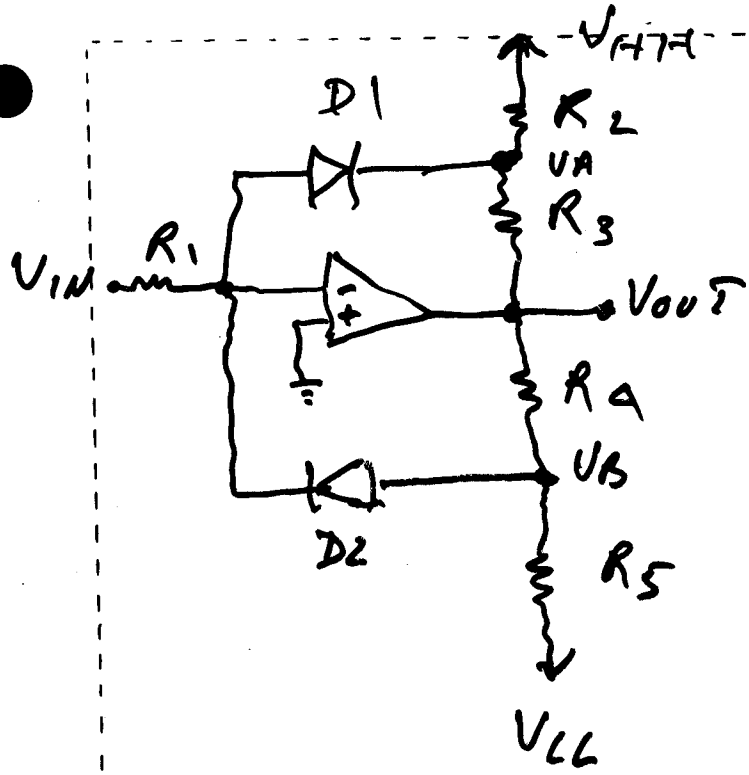
∴ AN OP-AMP WITH $A_V = \infty$

SIMPLE COMPARATOR:





COMPARATOR WITH VARIABLE GAIN L+/L−:



$V_{REF} = 0$

INVERTING COMPARATOR.

D1 IS ON when $V_A \leq 0$

$$V_A = V_{HH}\frac{R_3}{R_2+R_3} + V_{OUT}\frac{R_2}{R_2+R_3}$$

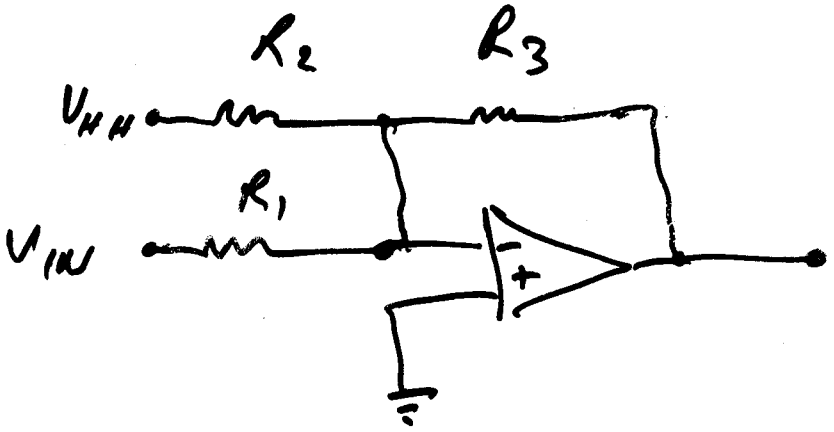
$$0 = V_{HH}\frac{R_3}{R_2+R_3} + V_{OUT}\frac{R_2}{R_2+R_3}$$

$$V_{OUT} = -\frac{R_3}{R_2}V_{HH} = L^-$$

D2 ON when $V_B \geq 0$

$$V_{OUT} = -\frac{R_4}{R_5}V_{LL}$$

D1 IS ON: $(V_{IN} > 0)$



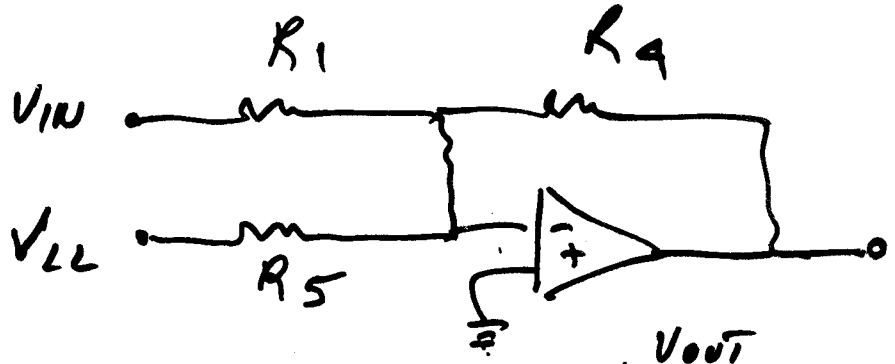
$$V_{OUT} = -\frac{R_3}{R_1} V_{IN} - \frac{R_3}{R_2} V_{HH}$$

$R_1 >> R_2$

$$V_{OUT} = -\frac{R_3}{R_2} V_{HH}$$

D2 IS ON: $(V_{IN} < 0)$

$\therefore R_1 >> R_5$



$$V_{OUT} = -\frac{R_4}{R_5} V_{LL}$$