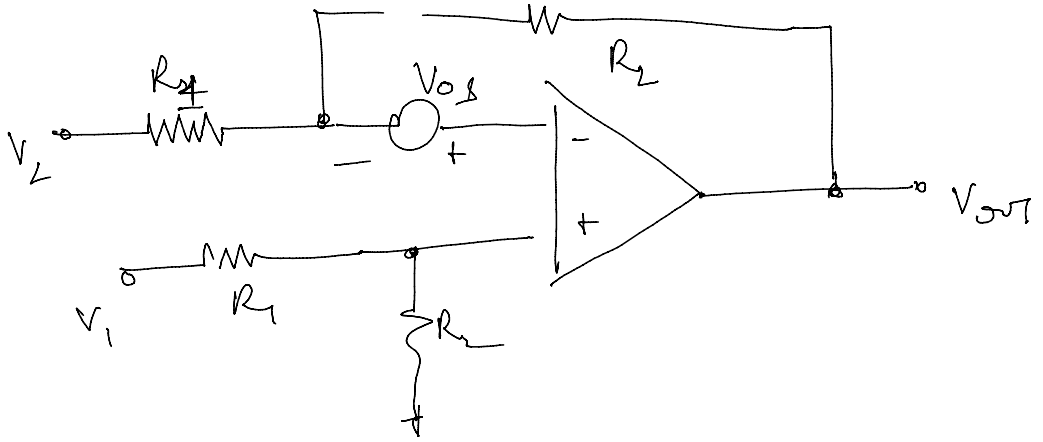
EFFECT OF OFFSET ON DIFFERENTIAL AMPLIFIER



$$\frac{V_1 R_2}{R_1+R_2} = \frac{V_{OUT1} R_1}{R_1+R_2} + V_{OS}$$

$$\text{or } V_{OUT1} = \frac{V_1 R_2}{R_1} - V_{OS}\frac{(R_1+R_2)}{R_1}$$

$$\frac{V_{OUT2} - V_2}{R_1+R_2} \cdot R_1 + V_2 + V_{OS} = 0$$

$$V_{OUT2} = -\frac{V_2 R_2}{R_1} - V_{OS}\frac{(R_1+R_2)}{R_1}$$

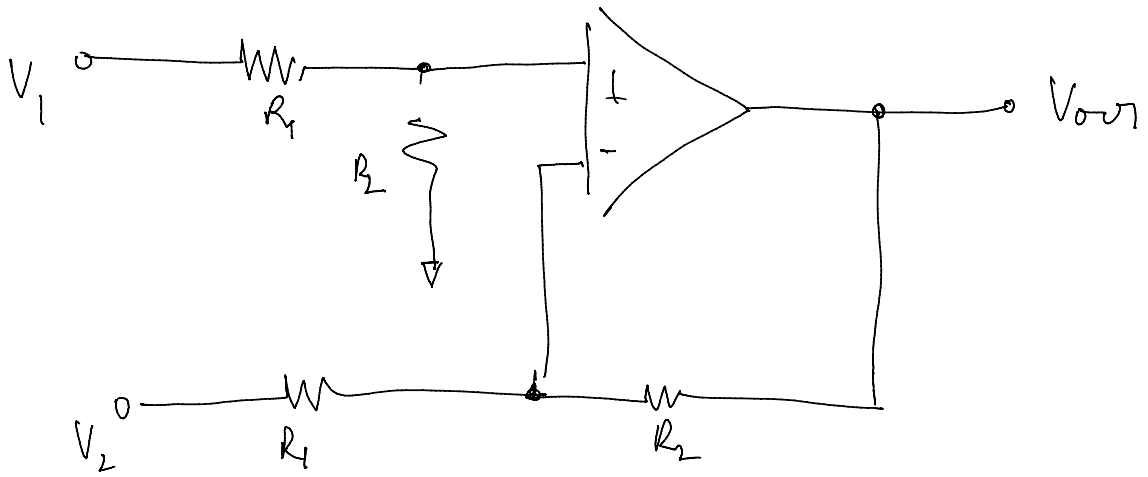
$$V_{OUT} = V_{OUT1} + V_{OUT2}$$

$$\Rightarrow V_{OUT} = (V_1 - V_2)\frac{R_2}{R_1} - \frac{(R_1+R_2)}{R_1} V_{OS}$$

$$\text{or } V_{OUT} = \left(V_1 - V_2 - V_{OS}\frac{(R_1+R_2)}{R_2}\right)\frac{R_2}{R_1}$$

$$\therefore \text{OFFSET} = V_{OS}\frac{R_1+R_2}{R_2}$$

DIFFERENTIAL AMPLIFIER CLOSED LOOP POLE:



For $V_2 = 0$

$$V_{OUT} = \left(V_1 \frac{R_2}{R_1+R_2} - V_{OUT} \frac{R_1}{R_1+R_2} \right) A$$

or

$$V_{OUT} = \frac{V_1 \frac{R_2}{R_1+R_2} A}{1 + A \frac{R_1}{R_1+R_2}}$$

if $A = \frac{K}{s+p}$ (Dominant pole system)
(Effectively 1 Pole System)

$$V_{OUT} = \frac{V_1 \frac{R_2 K}{R_1+R_2}}{s + p + \frac{KR_1}{R_1+R_2}}$$