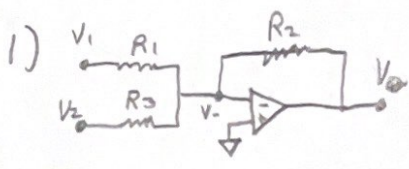
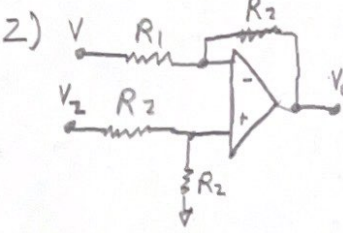


WS 9

1)  $V_+ = V_- = 0$ $i_+ = i_- = 0$
$$\left\{ \begin{aligned} \frac{V_1 - V_-}{R_1} + \frac{V_2 - V_-}{R_3} &= \frac{V_- - V_0}{R_2} \\ \frac{V_1 + V_2}{R_1 + R_3} &= -\frac{V_0}{R_2} \Rightarrow V_0 = -R_2 \left(\frac{V_1}{R_1} + \frac{V_2}{R_3} \right) \end{aligned} \right.$$

2)  $i_+ = i_-$ $V_+ = V_-$
$$V_+ = \left(\frac{R_2}{2R_2} \right) V_2 = \frac{V_2}{2} = V_-$$
 $i_+ = i_- = 0$
$$\Rightarrow \frac{V_1 - V_-}{R_1} = \frac{V_- - V_0}{R_2} \Rightarrow \frac{V_1 - \frac{V_2}{2}}{R_1} = \frac{\frac{V_2}{2} - V_0}{R_2}$$

$$V_1 \left(\frac{R_2}{R_1} \right) - \frac{V_2}{2} \left(\frac{R_2}{R_1} \right) - \frac{V_2}{2} = -V_0 \Rightarrow V_0 = \frac{V_2}{2} \left(1 + \frac{R_2}{R_1} \right) - V_1 \left(\frac{R_2}{R_1} \right)$$

