EE40
Lecture 25
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4/02/08

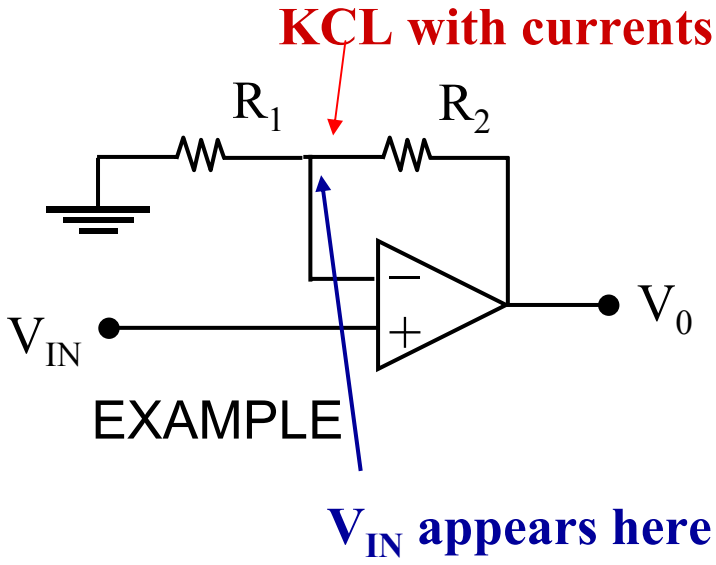
Reading: Chap. 14: Operational Amplifiers+ Chap. 10: Diodes

Ideal Op-Analysis: Non-Inverting Amplifier

Yes Negative Feedback is present in this circuit!

Assumption 1: The potential between the op-amp input terminals, $v_{(+)} - v_{(-)}$, equals zero.

Assumption 2: The currents flowing into the op-amp's two input terminals both equal zero.



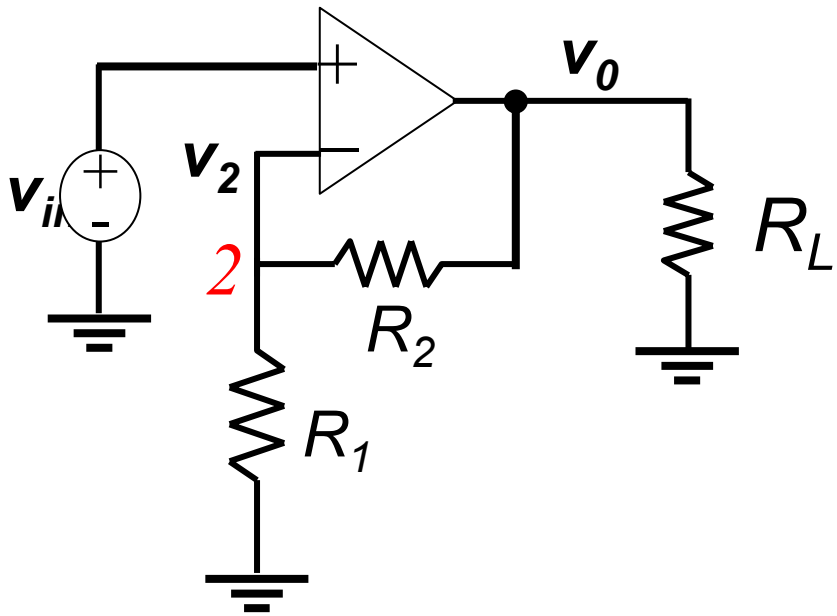
$$\frac{v_{in}}{R_1} + \frac{v_{in} - v_{out}}{R_2} = 0$$

$$v_{out} = \frac{R_1 + R_2}{R_1} v_{in}$$

Non-inverting Amplifier

Non-Inverting Amplifier

- Ideal voltage amplifier



$$Closed\ \ loop\ \ gain = A_v = \frac{v_o}{v_{in}}$$

$$v_1 = v_2 = v_{in}\ , i_1 = i_2 = 0$$

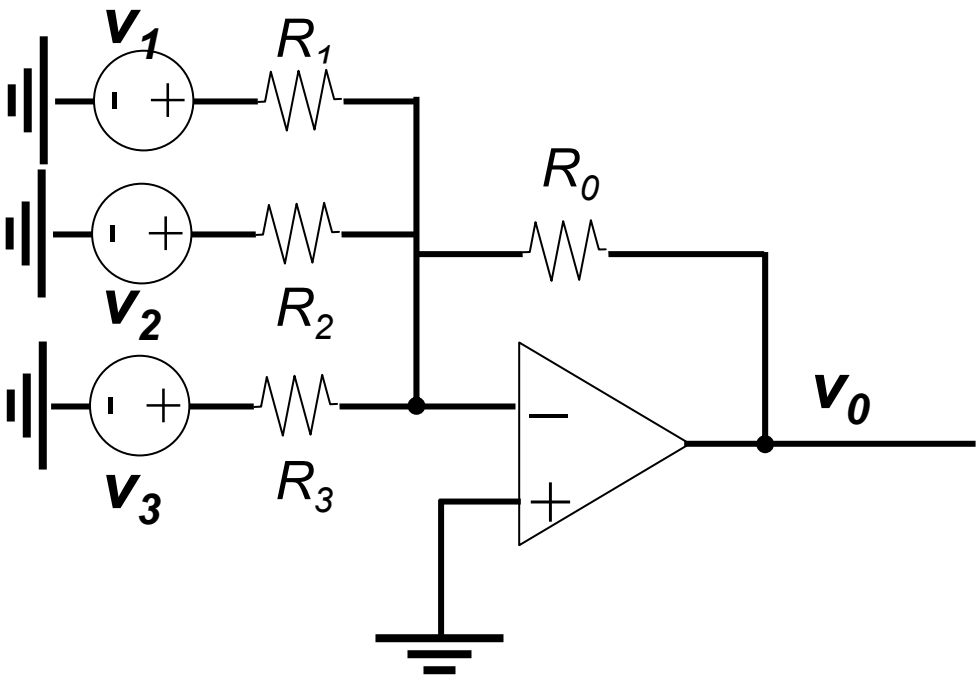
$$Use\ \ KCL\ \ At\ \ Node\ \ 2.$$

$$i = \frac{(v_0 - v_2)}{R_2} = \frac{(v_2 - 0)}{R_1}$$

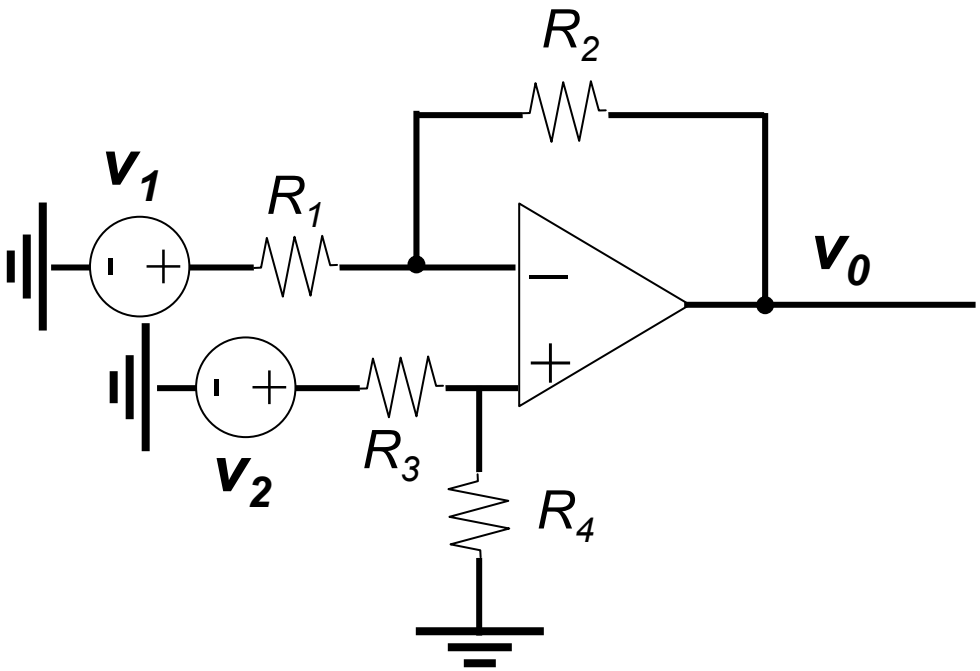
$$A = \frac{v_o}{v_{in}} = \frac{(R_1 + R_2)}{R_1}$$

$$Input\ \ impedance = \frac{v_{in}}{i} \rightarrow \infty$$

Summing Amplifier

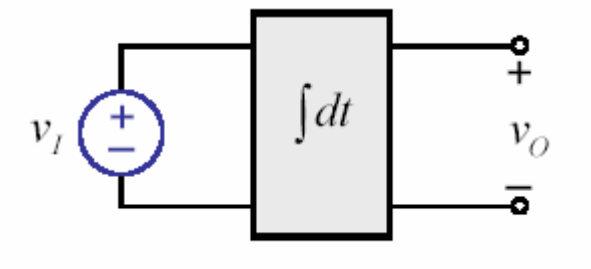


Difference Amplifier

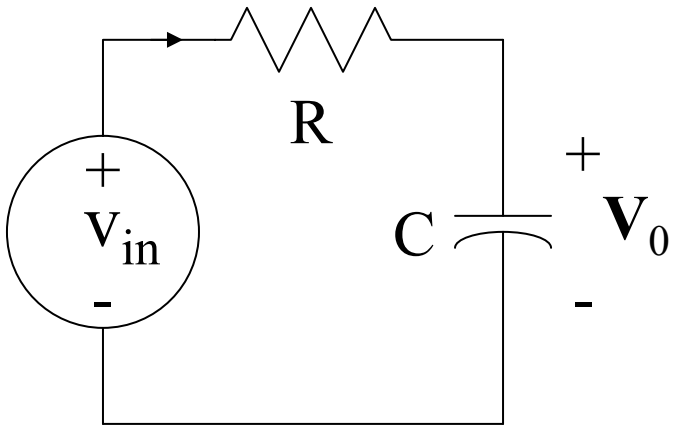


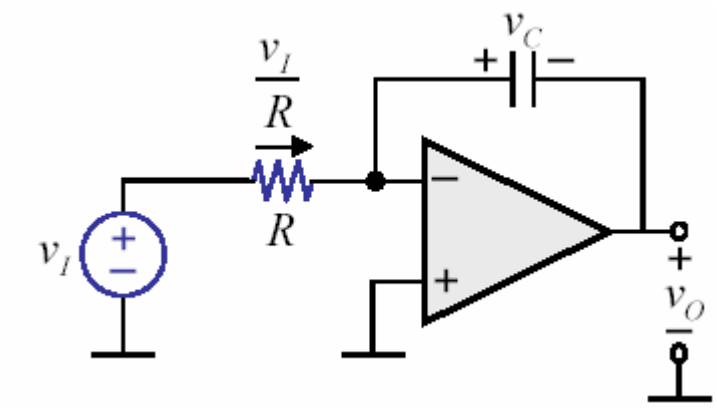
Integrator

- Want $v_o = K\int v_{in}\,dt$



- What is the difference between:





$$v_O \approx \frac{1}{RC}\int_{-\infty}^{t} v_I\,dt$$

$$v_O = -\frac{1}{C}\int_{-\infty}^{t}\frac{v_I}{R}dt$$

Differentiator

- Want