

INVERTING AMPLIFIER GAIN DERIVATION VIRTUAL GROUND CONCEPT

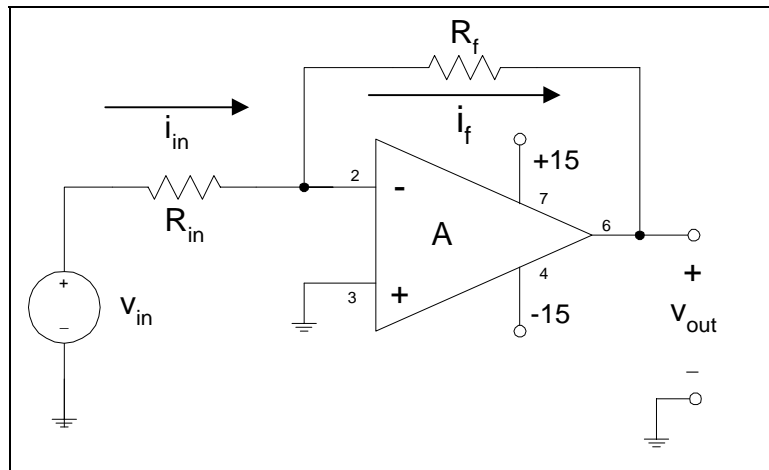
ASSUMPTIONS: INFINITE INPUT IMPEDANCE: $\therefore i_+ = 0; \quad i_- = 0$

ZERO VOLTAGE DROP BETWEEN INPUTS, and $A = \infty$.

ZERO AC INPUT CURRENT. $v_- = 0$ because v_+ is grounded.

ASSUMPTIONS HOLD FOR: $A \gg A_V = \frac{-R_f}{R_{in}}$

LET $R_s = 0$, OR INCLUDE IT AS PART OF R_{in} ; THEN:



$$i_{in} - i_f = 0$$

$$\frac{v_{in} - 0}{R_{in}} - \frac{0 - v_{out}}{R_f} = 0$$

$$\frac{v_{out}}{v_{in}} = \frac{-R_f}{R_{in}} = A_v$$