

Non Inverting Amp

Transfer Function Derivation

- Ideal op-amp conditions (simplify derivation)
 - virtual short at inputs (voltage at + same as at -)
 - no current into input terminals
- Non-inverting amplifier gain transfer function
 - write equations of operation from schematic using Ohms law

- $V_x = R_1 * i_1$

- $V_{out} - V_x = R_2 * i_2$

- apply ideal op-amp conditions

- virtual short $\rightarrow V_x = V_{in}$

- no input current $\rightarrow i_1 = i_2 = i$

- thus

- $V_{in} = R_1 * i \rightarrow i = V_{in}/R_1$

- $V_{out} - V_{in} = R_2 * i \rightarrow i = (V_{out}-V_{in})/R_2$

- and setting $i = i...$

- $\rightarrow V_{in}/R_1 = (V_{out}-V_{in})/R_2 \rightarrow V_{out}/R_2 = V_{in}/R_1 + V_{in}/R_2 = V_{in} \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$

- $\rightarrow V_{out}/V_{in} = 1 + \frac{R_2}{R_1}$

