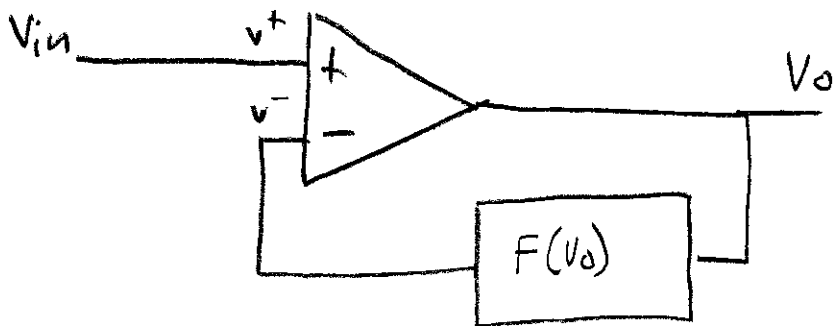


# NON-LINEAR FEEDBACK



$$v^+ = V_{in}$$

$$v^- = F(V_o)$$

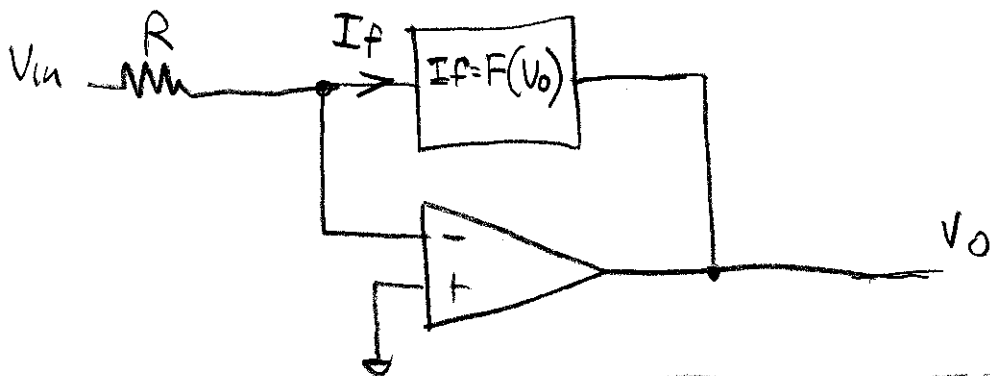
$$v^+ = v^-$$

$$V_o = F^{-1}(V_{in})$$

Note that some constants with units have been omitted for clarity

If:  $F(V_o) = V_o^2$  then  $V_o = \sqrt{V_{in}}$   $0 < V_{in}$   
 $F(V_o) = e^{V_o}$  then  $V_o = \ln(V_{in})$   $0 < V_{in}$

If  $V_{in}$  is outside the meaningful range of  $F^{-1}$  then  $V_o$  is undefined — this means  $V_o$  is at the positive or negative saturation values



$$\frac{V_{in}}{R} = -I_f$$

$$\therefore V_o = -F^{-1}\left(\frac{V_{in}}{R}\right)$$

ex. If  $I_f = e^{V_o}$   
 $V_o = -\ln\left(\frac{V_{in}}{R}\right)$