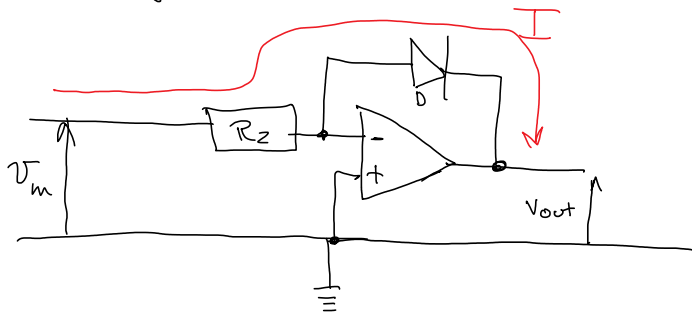
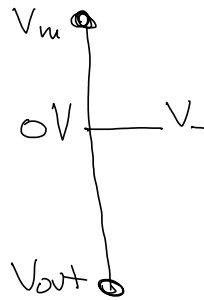


Log Amplifier



$I_{R_z} = I_{Diode}$ when forward biased
Rule 2, $I_- = 0$
 $V_{out} < V_{in}$

but $V_- = V_+ = 0V$
Rule 1



$$I_{R_z} = \frac{V_{in} - 0}{R_z} = \frac{V_{in}}{R_z}$$

$$I_D = I_s e^{-40(V_{out} - 0)}$$

$$I_{R_z} = I_D$$

$$\frac{V_{in}}{R_z} = I_s e^{-40(V_{out})}$$

$$-\ln\left(\frac{V_{in}}{R_z I_s}\right) = 40 V_{out}$$

$$V_{out} = -\frac{1}{40} \ln\left(\frac{V_{in}}{R_z I_s}\right)$$