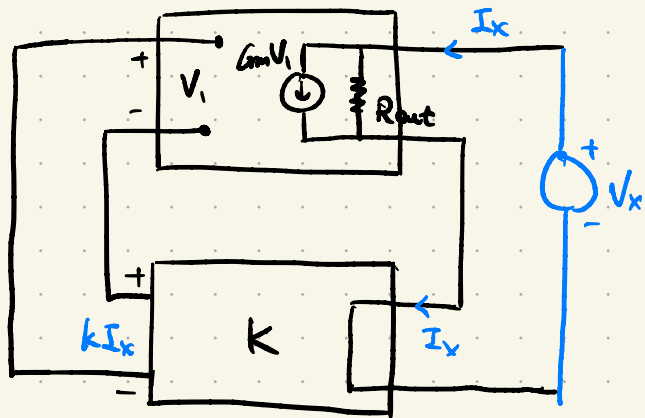# Lec 39
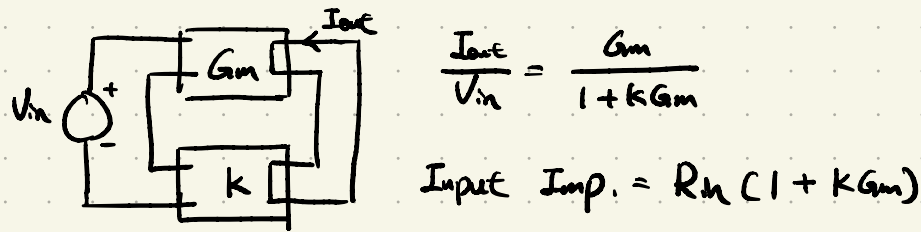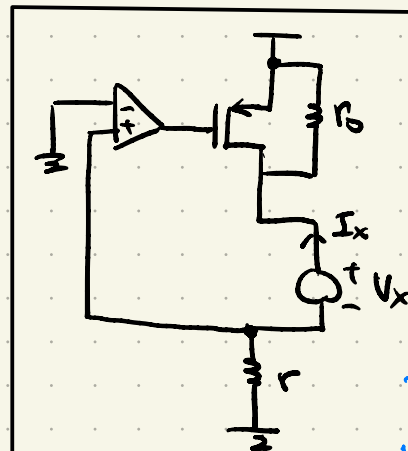
- Application Example of Feedback
- Current - Voltage Feedback
- Current - Current Feedback

• **Current - Voltage Feedback**



$$\frac{I_{out}}{V_{in}} = \frac{G_m}{1 + k G_m}$$
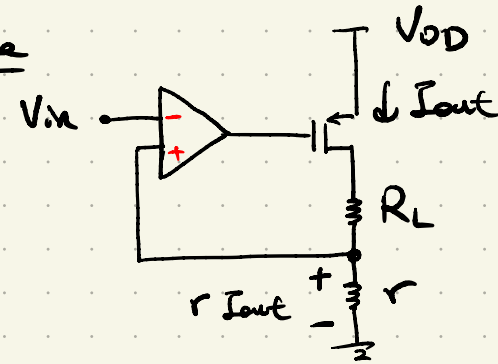
Input Imp. $= R_{in}(1 + k G_m)$



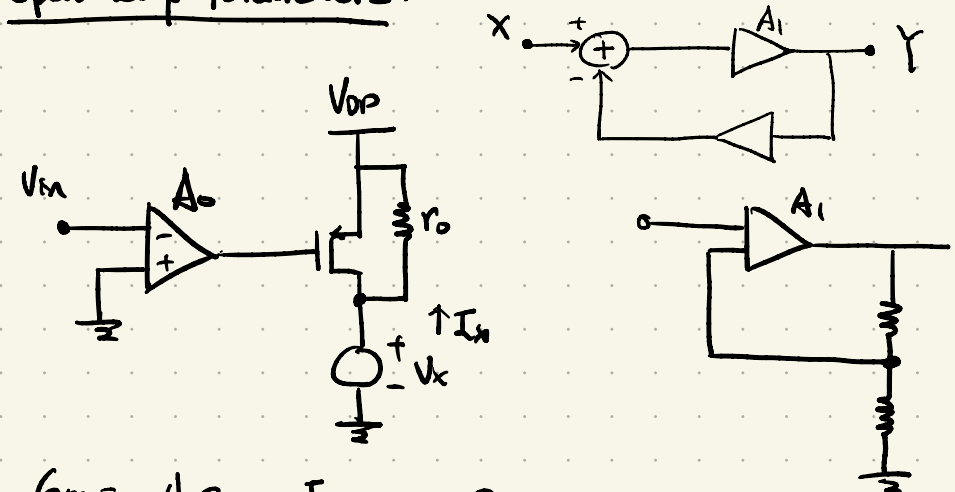$$-k I_x G_m + \frac{V_x}{R_{out}} = I_x$$

$$\Rightarrow \frac{V_x}{I_x} = R_{out}(1 + k G_m)$$

## Example



## Open-Loop Parameters:



$$G_m = -A_o g_m = \frac{I_{out}}{V_{in}} \qquad R_{out} = r_o$$

## Closed-Loop Parameters

$$G_m = \frac{-A_o g_m}{1 + A_o g_m r}$$

Loop gain $= A_o g_m r$

$$\frac{V_x}{I_x} = r_o(1 + A_o g_m r)$$

To measure the Output Imp. we should exclude the load ($R_L$)