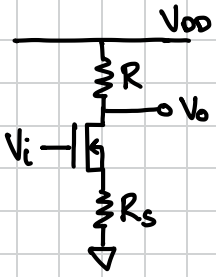
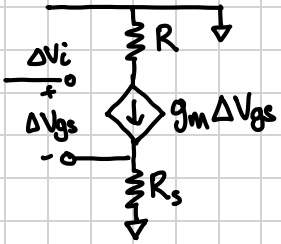
COMMON SOURCE AMPLIFIER

$$\Delta V_o = -g_m R \Delta V_{gs}$$

$$g_m = \mu_n C_{ox} \frac{W}{L} (V_{gs} - V_{th})$$

SOURCE GENERATION





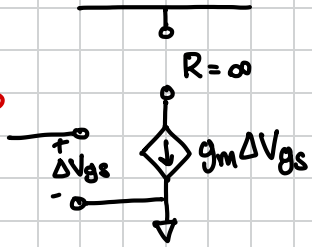
$$\Delta i = g_m \Delta V_{gs} = g_m (\Delta V_i - R_s \Delta i)$$

negative feedback

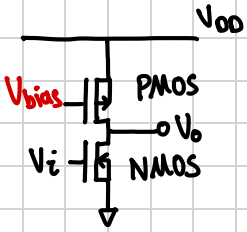
$$\Delta i (1 + R_s g_m) = g_m \Delta V_i$$

$$\Delta i = \frac{g_m}{1 + R_s g_m} \Delta V_i$$

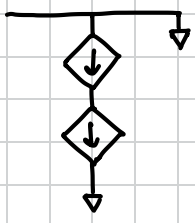
$\Delta i = 0$



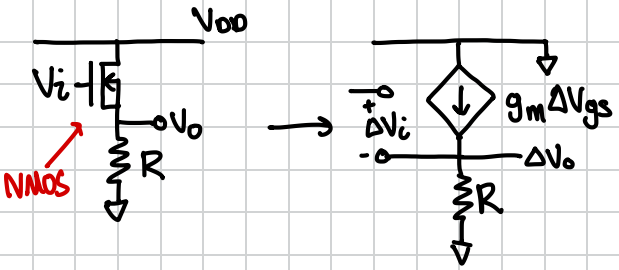
$$\Delta V_o = -\infty \Delta V_i$$



$$V_{sg} = V_{DD} - V_{bias}$$



COMMON DRAIN AMPLIFIER

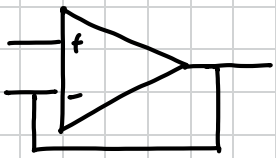


$$\Delta V_o = R \times g_m \Delta V_{gs}$$
$$= R \times g_m (\Delta V_i - \Delta V_o)$$

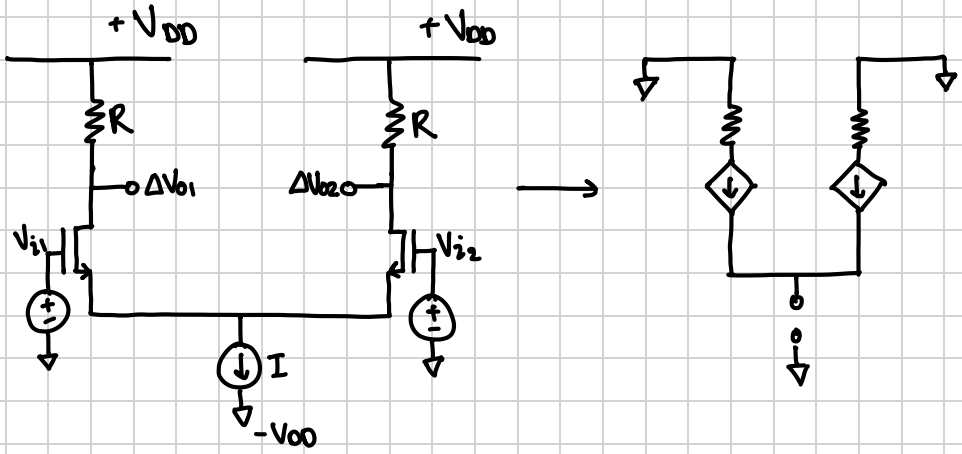
negative feedback

$$\Delta V_o = \frac{R g_m}{1 + g_m R} \Delta V_i$$

$\Delta V_o = \Delta V_i$ gain ≈ 1 (Source Follower)



COMMON SOURCE
DRAIN
GATE
} AMPLIFIER BUILDING BLOCKS



Common-mode voltage