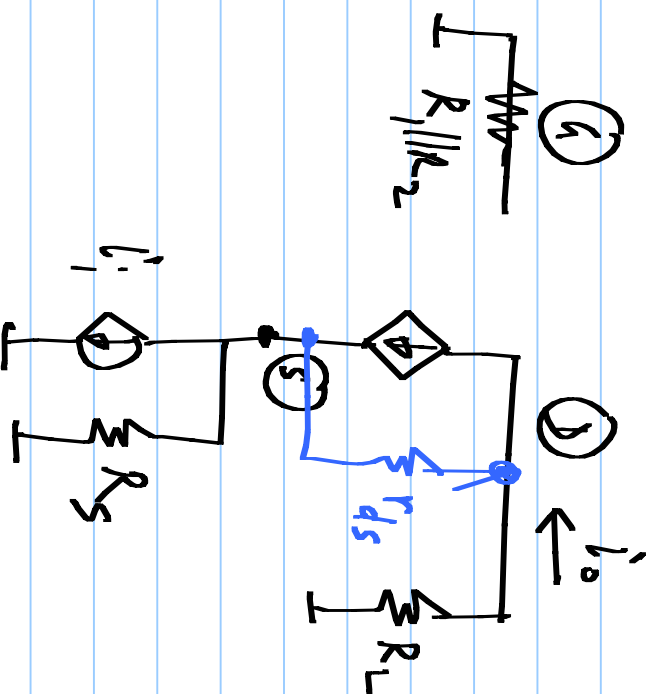


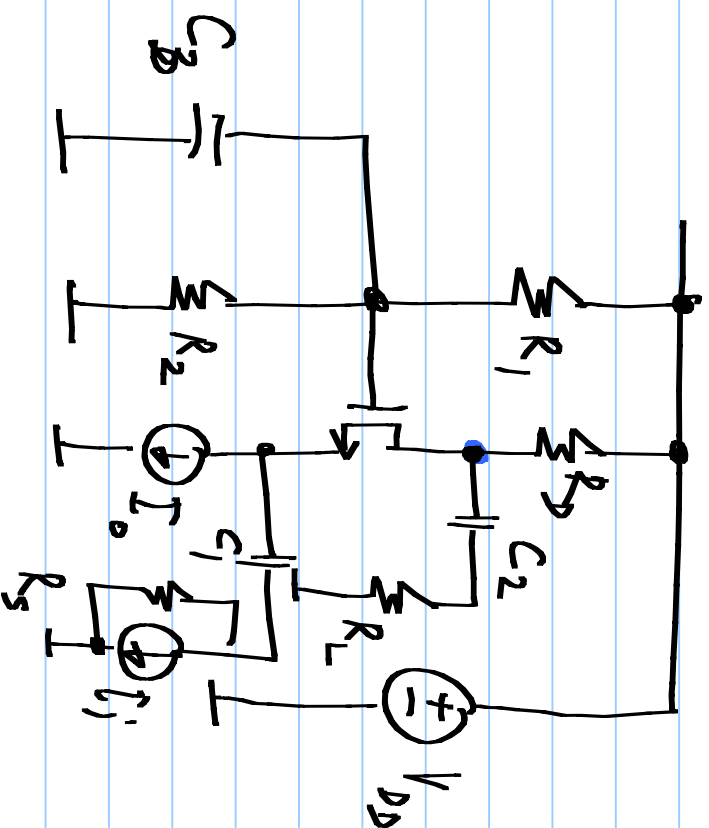
Lecture 25

Common gate amplifier

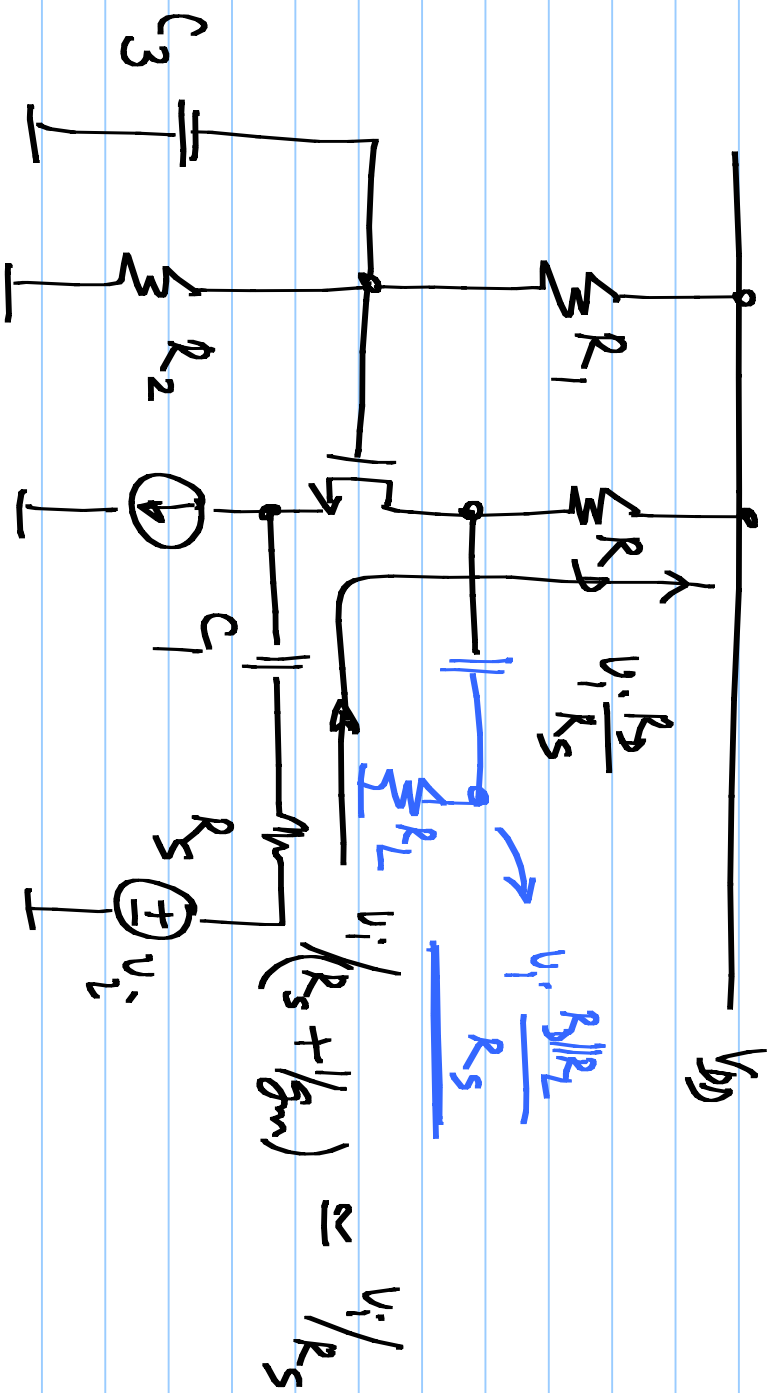


CCS: R_i : low, R_o : high

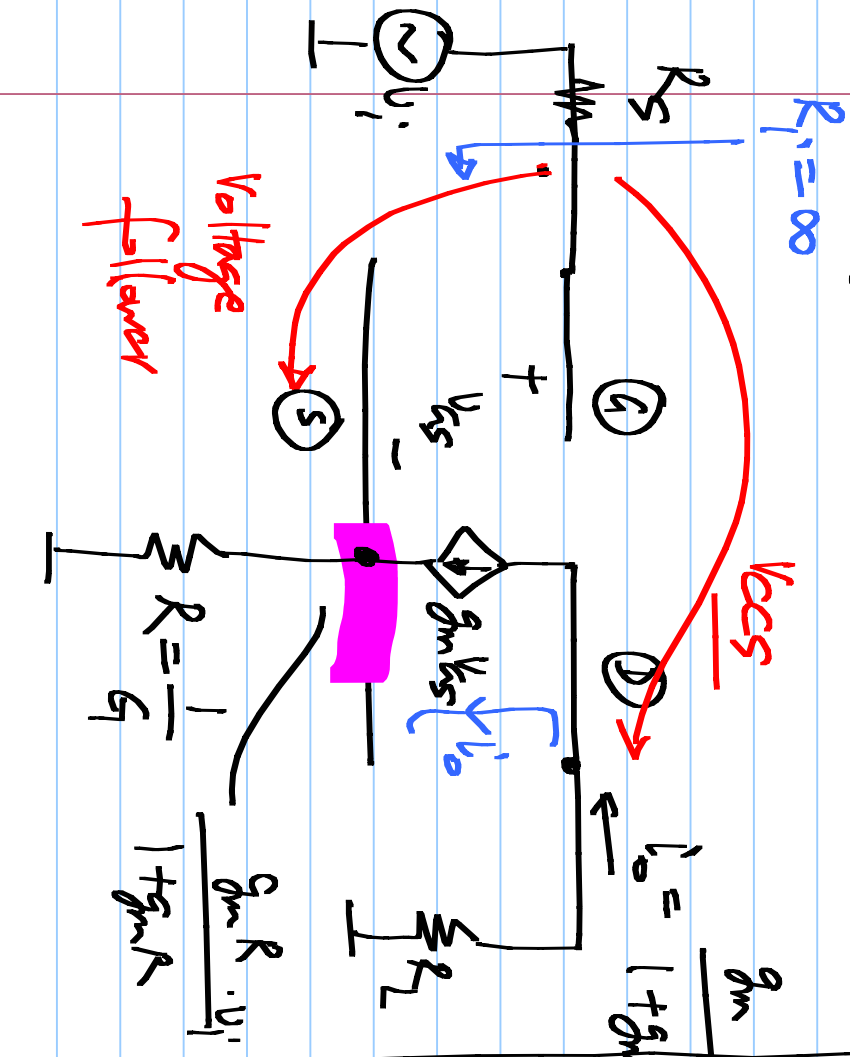
$$\frac{i_o}{i_i} \approx 1$$



Common gate amplifier w/ current input



Voltage controlled current source V_{CS}



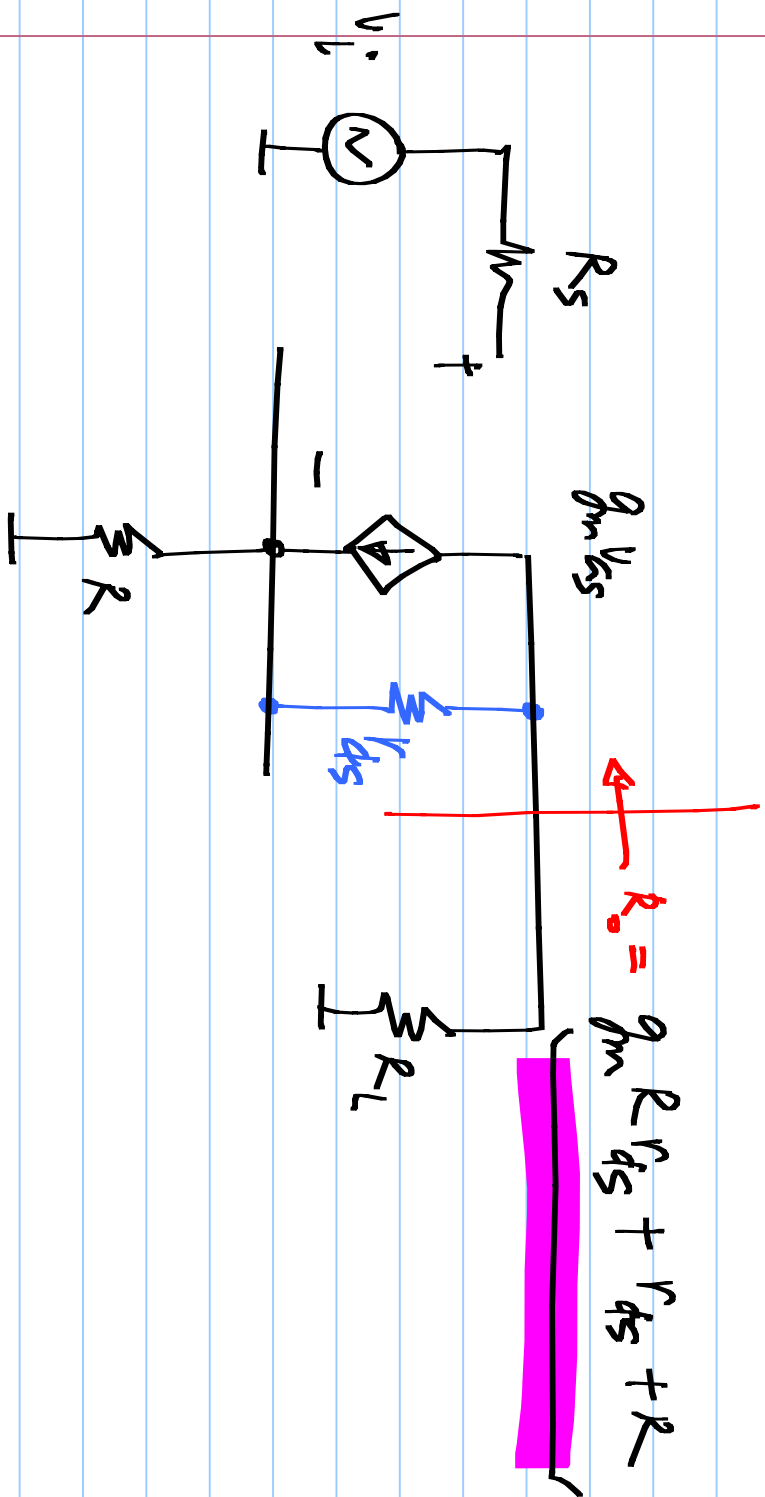
$$i_o = g_m \cdot v_i$$

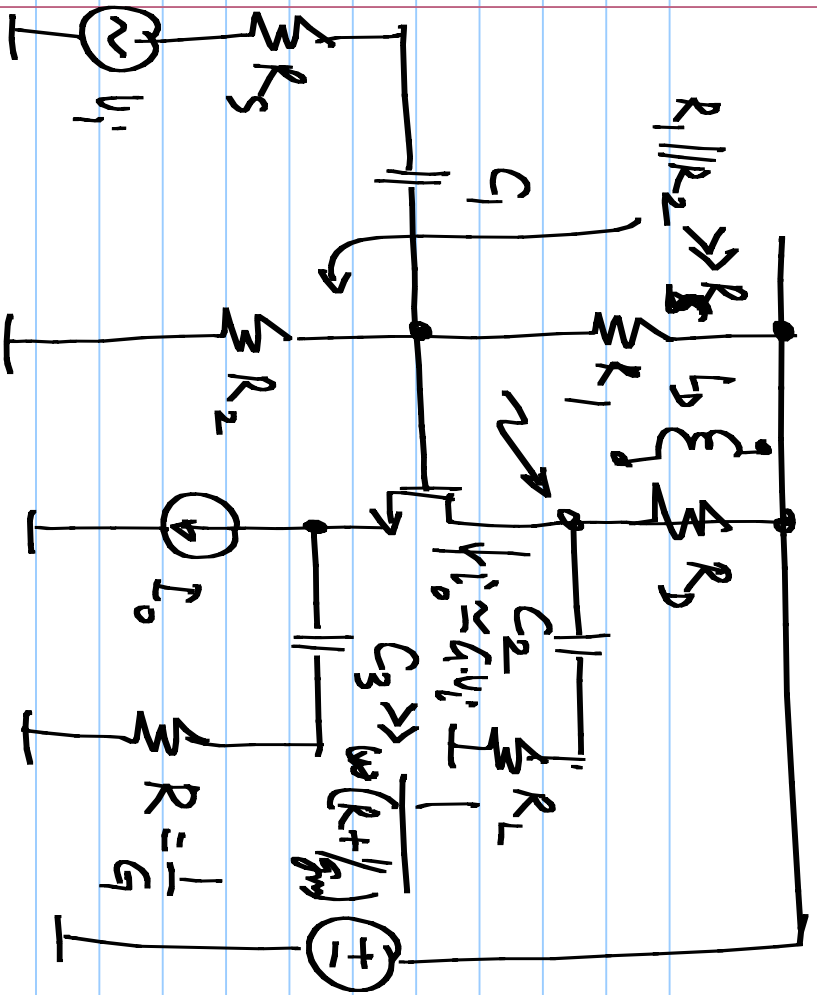
$$(v_i - \frac{i_o}{g}) = 0$$

$$\left(\frac{1}{R}\right) \left(\frac{g_m R}{1 + g_m R}\right) \frac{i_o}{g} - v_i = 0$$

$v_i > \frac{i_o}{g}$: i_o must increase
 v_{CS} must increase

$v_i < \frac{i_o}{g}$: i_o must decrease
 v_{CS} must decrease





$$\omega L_D \gg R_L \quad \frac{2\pi \times 20 \text{ rad/s}}{2\pi \times 2.4 \text{ k}\Omega^2} = 15 \times 10^9 \text{ rad/s}$$

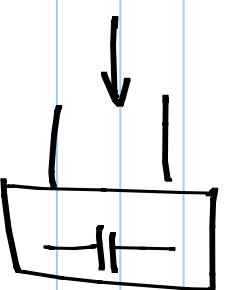
$$100 \cdot L_D \gg 10^3 \quad 1 \text{ k}\Omega$$

$$L_D \gg 10 \text{ H}$$

$$10^4 L_D \gg 10^3$$

$$L_D \gg 10 \text{ mH}$$

$s(L)$



$$G_3 \gg \frac{1}{\omega R}$$

x

Z
Y

