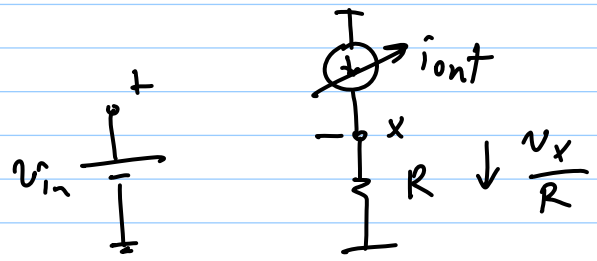
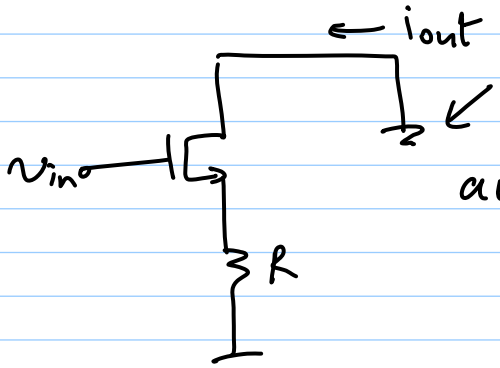
27-9-12

Lec 26

incl. VCCS using a MOSFET $i_{out} = \frac{v_{in}}{R}$



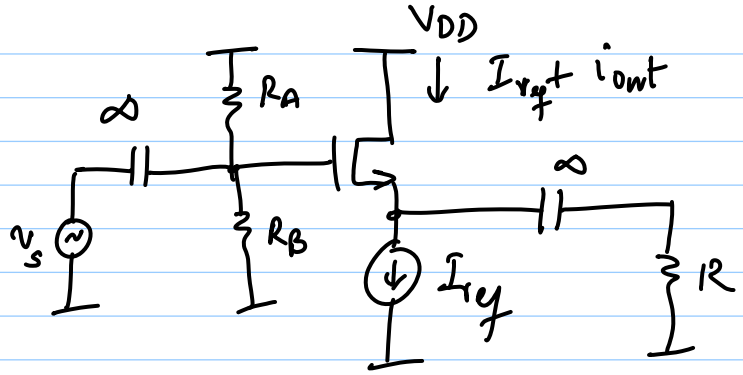
$v_x \longleftrightarrow i_{out}$



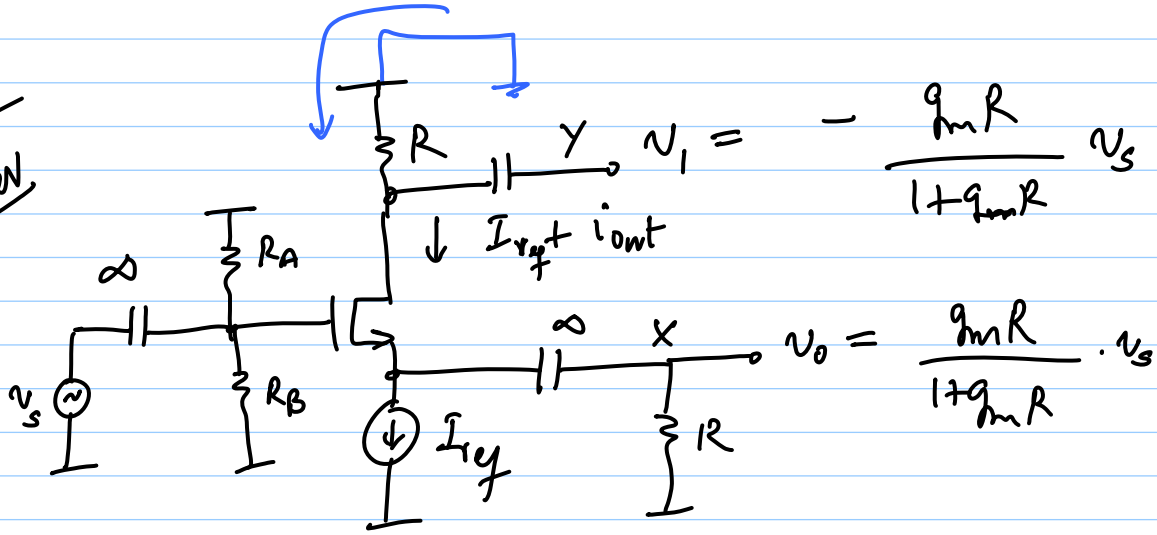
$g_m \to \infty$

actual $i_{out} = \frac{g_m v_{in}}{1 + g_m R}$

TRANS ADMITTANCE AMPLIFIER



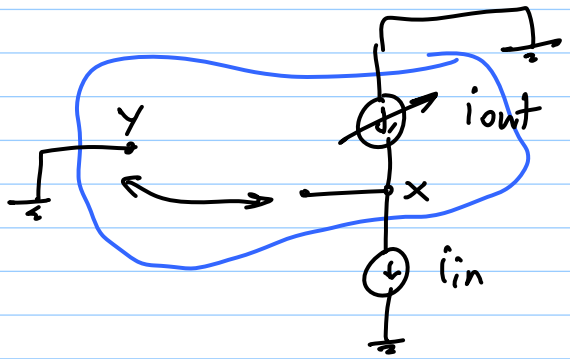
Phase Splitter



Incremental CCCS

$Z_{in} = 0$; $Z_{out} = \infty$

$i_{out} = i_{in}$



If $V_x \uparrow \Rightarrow i_{out}$ is too high

$\Rightarrow \downarrow i_{out}$

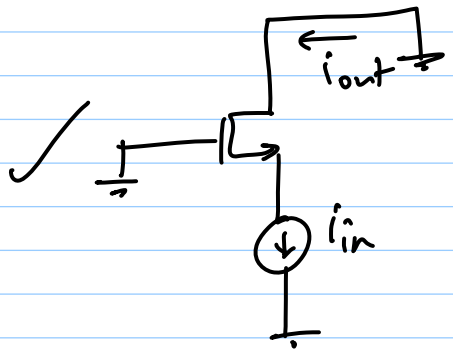
If $V_x \downarrow \Rightarrow i_{out}$ is too low

$\Rightarrow \uparrow i_{out}$

compare V_x with gnd

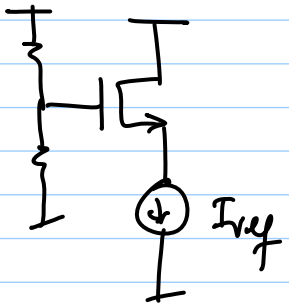
$i_{out} \propto (V_y - V_x) \Rightarrow i_{out} = g_m(V_y - V_x)$

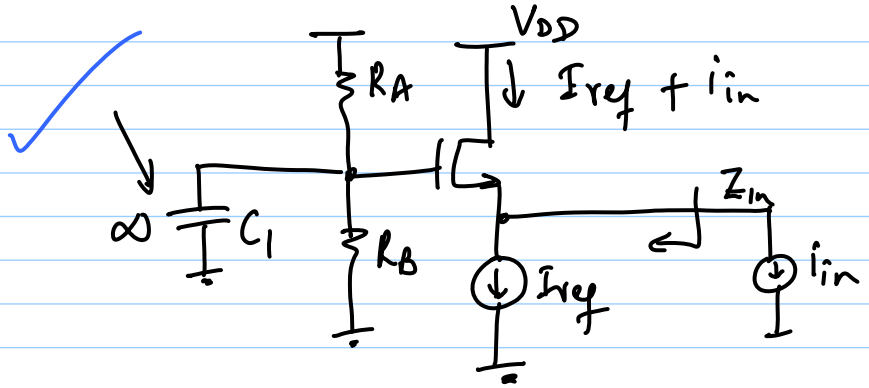
$= -g_m V_x$



$g_m \to \infty \quad V_x \to 0$

& $i_{out} = i_{in}$





$Z_{in} = 1/g_m$

$Z_{in} \to 0$ as $g_m \to \infty$

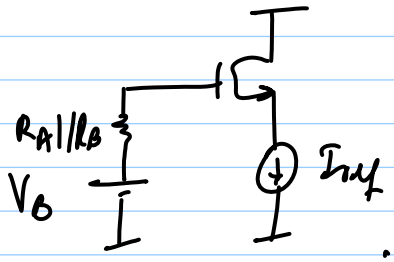
$Z_{out} = \infty$

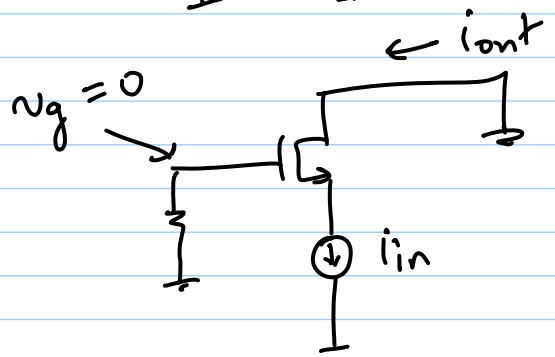
COMMON GATE AMPLIFIER

$i_{out} = i_{in}$ independent of g_m

no C_1

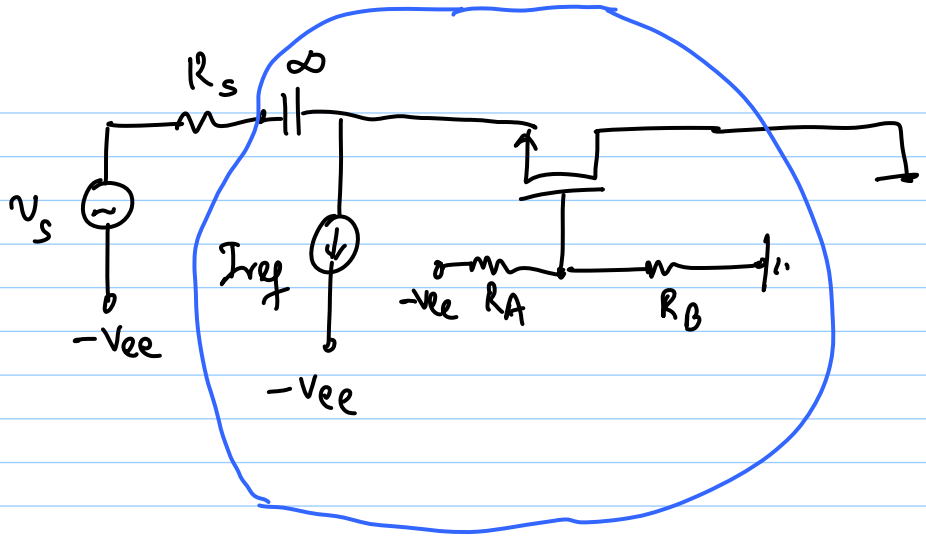
DC

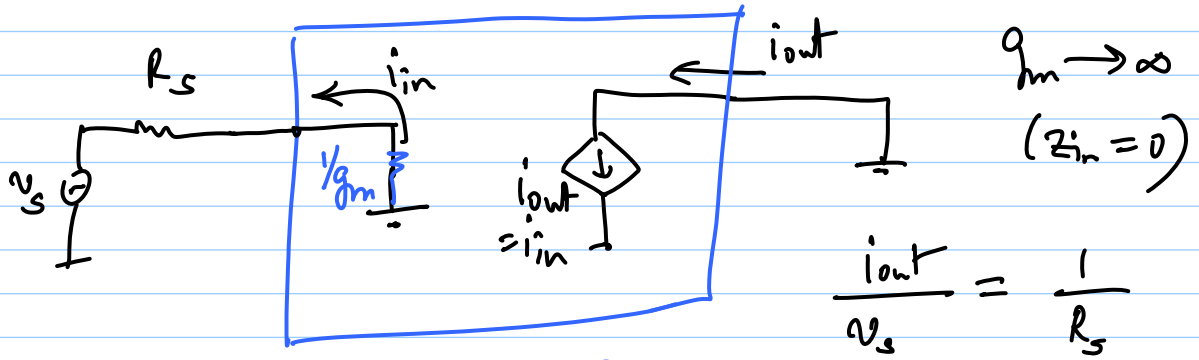




i_g (ac) $\neq 0$

$I_G \geq 0$ always (DC)





$g_m \to \infty$

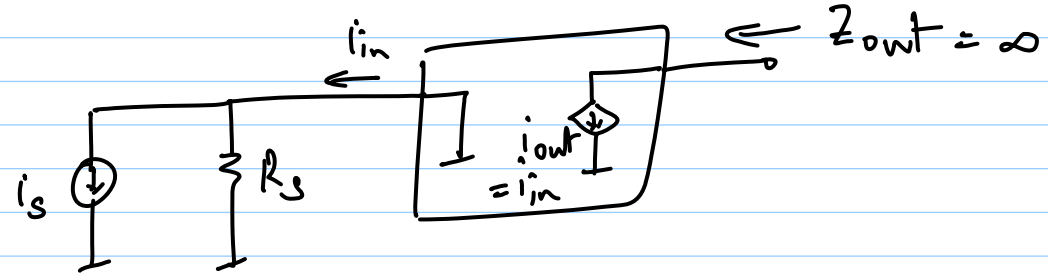
$(z_{in} = 0)$

$$\frac{i_{out}}{v_s} = \frac{1}{R_s}$$

g_m is finite

$$\frac{i_{out}}{v_s} = \frac{g_m}{1 + g_m R_s}$$

large $g_m \Rightarrow g_m \gg \frac{1}{R_s}$



$g_m \to \infty$ $\quad i_{in} = i_s$