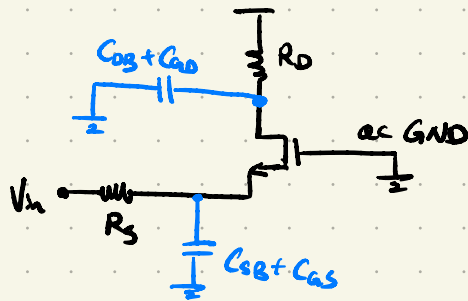
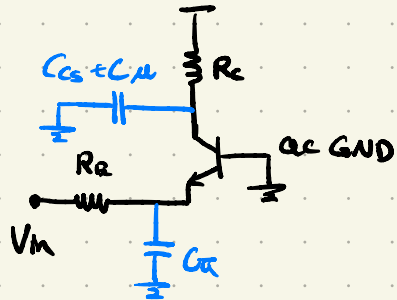
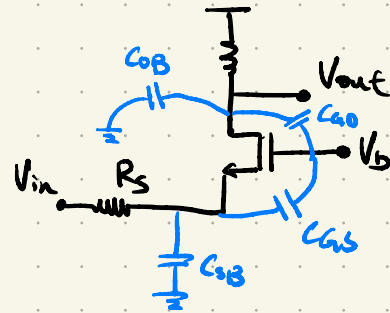
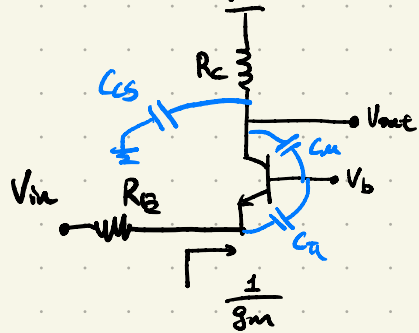


# Lec 23

- Examples of High-Speed Circuits
  - Freq. Response of Common-Base/Common-Gate Stage
- 
- Freq. Response of CB/CG Stage



- No Miller Effect
- Find the poles by inspection:

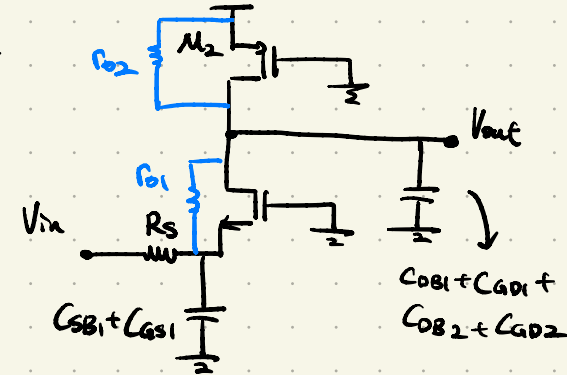
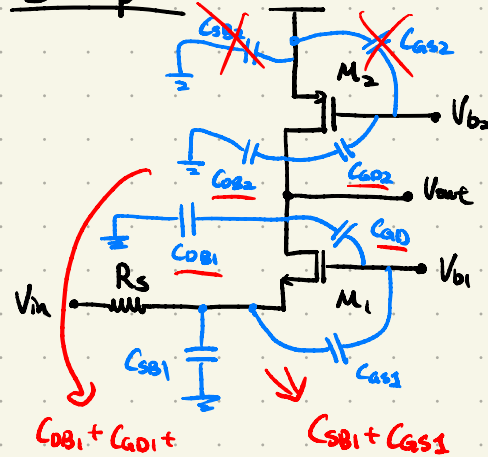
Input:  $\begin{cases} \text{Cap to ac GND: } C_{\pi} \\ \text{Resistance to ac GND: } R_B // \frac{1}{g_m} \end{cases} \Rightarrow \omega_{p,in} = \frac{1}{(R_B // \frac{1}{g_m}) C_{\pi}}$

Output:  $\begin{cases} \text{Cap} = C_{cs} + C_{\mu} \\ \text{Res} = R_C \end{cases} \Rightarrow \omega_{p,out} = \frac{1}{R_C (C_{cs} + C_{\mu})}$

For the CG Stage:  $\omega_{p,in} = \frac{1}{(R_S // \frac{1}{g_m}) (C_{SB} + C_{as})}$

$$\omega_{p,out} = \frac{1}{R_D (C_{GD} + C_{DB})}$$

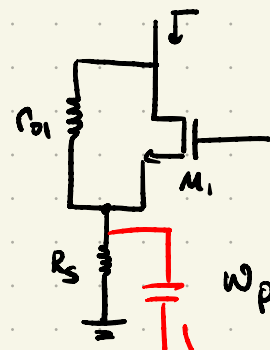
## Example



$\omega_{p,in} = \frac{1}{(R_S // \frac{1}{g_m}) (C_{SB1} + C_{as1})}$

*if  $\lambda \neq 0$ ,  $R_{in}$  not exactly  $\frac{1}{g_m}$*

Out:  $\begin{cases} \text{Case I: } \lambda = 0 \\ \Rightarrow \omega_{p,out} \rightarrow 0 \\ \text{Case II: } \lambda > 0 \end{cases}$



$$R_{out1} = (1 + g_{m1} R_{D1}) R_S + R_{D1}$$

$$\omega_{p,out} = \frac{1}{(R_{D2} // R_{out1}) (C_{DB2} + C_{GD2} + C_{GS2} + C_{GS1})}$$

*(neglecting  $C_{SB} + C_{as1}$ )*

