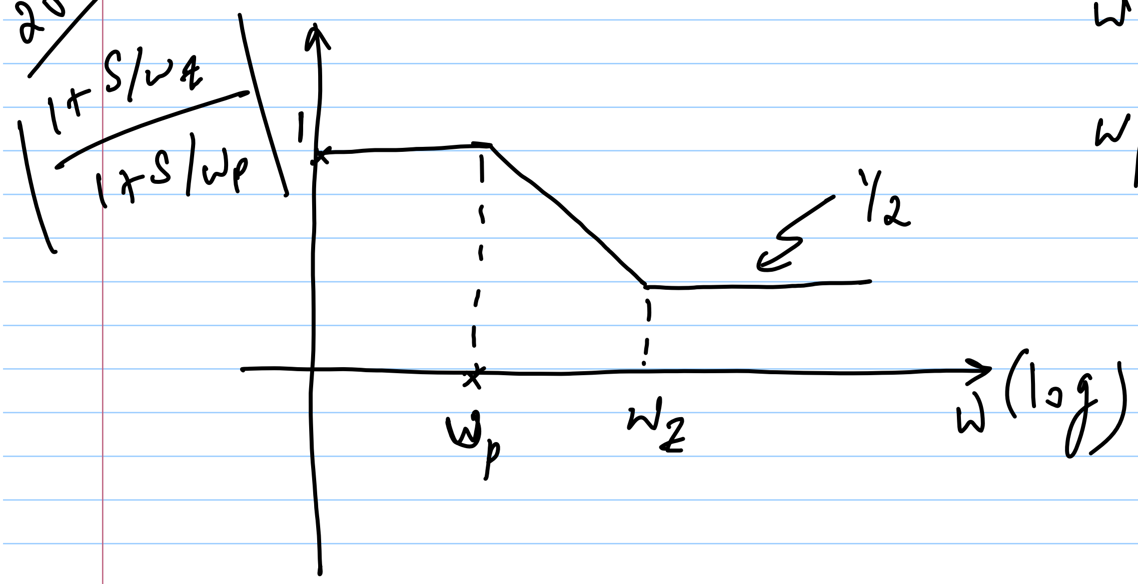
20-2-13

Lec 24

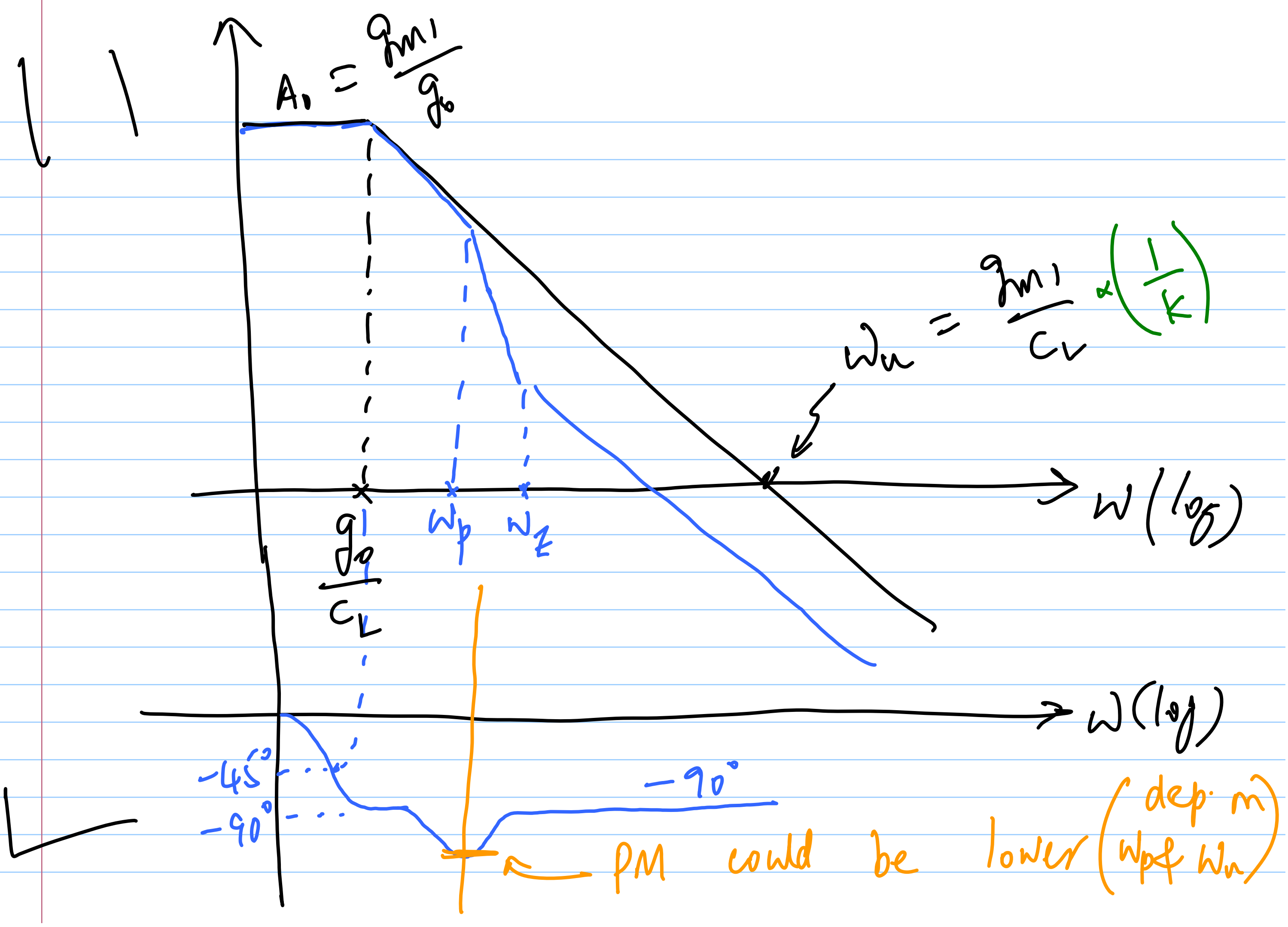
$$\omega_z = \frac{2 g_{m3}}{C_1}$$

$$\omega_p = \frac{g_{m3}}{C_1}$$



Worst-case for stability = unity gain

(k)

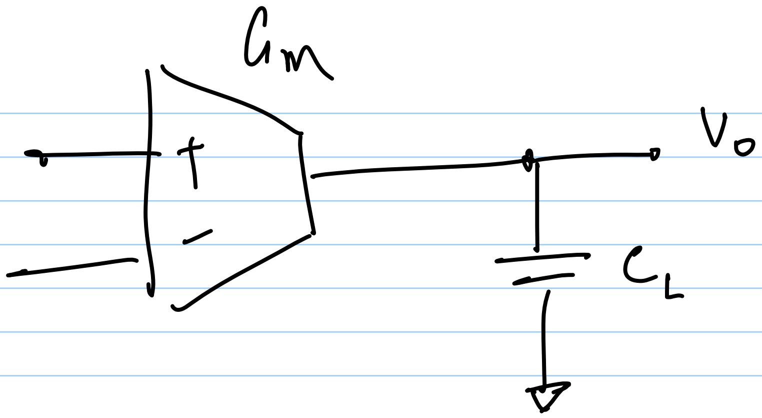


$\omega_p \gg \omega_n$

$$\boxed{\frac{g_{m_3}}{C_1} \gg \frac{g_{m_1}}{C_L}} \quad \left(\frac{1}{K}\right)$$

* $\uparrow C_L$ — BW of the system is reduced
* $\uparrow g_{m_3}$ — $\uparrow \left(\frac{W}{L}\right)_3$ but C_1 also $\uparrow$
* $\downarrow g_{m_1}$ — DC gain $\downarrow$
  $\omega_n \downarrow$
* $\downarrow C_1$ — $\downarrow \left(\frac{W}{L}\right)_3$, $V_{Dsat} \uparrow$

* $\uparrow I_o$ — does not help at all
  g_{m_1} & g_{m_3} $\uparrow$ together
* $\uparrow I_o$, $\downarrow \left(\frac{W}{L}\right)_3$, $\downarrow \left(\frac{W}{L}\right)_1$
  — g_{m_1} = constant ; ω_n = constant
  — $C_1 \downarrow$, $g_{m_3} \uparrow$ or same
* Burn more power for more BW
* give up a bit on swing limits



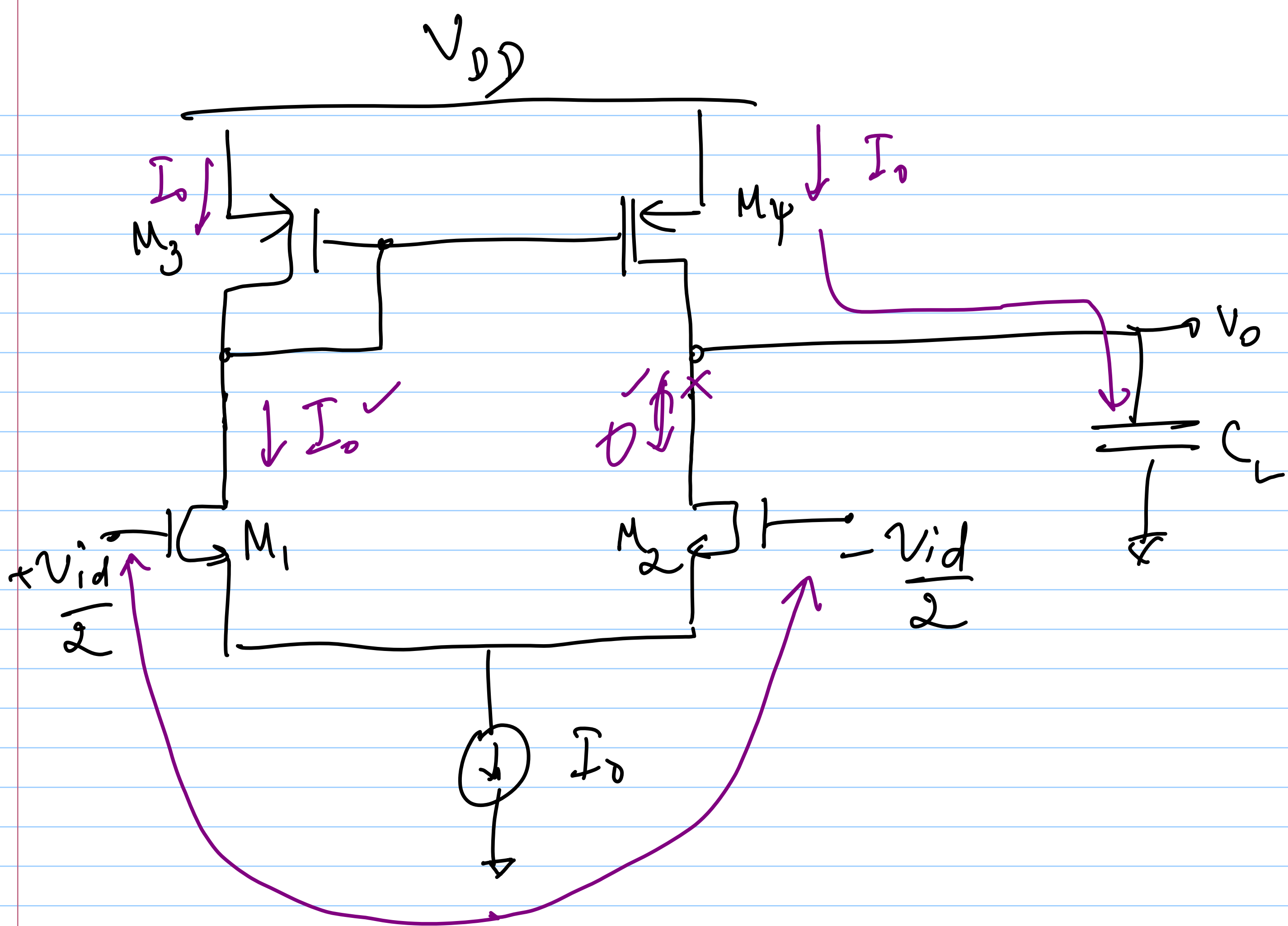
$$\omega_u = \frac{G_m}{C_L}$$

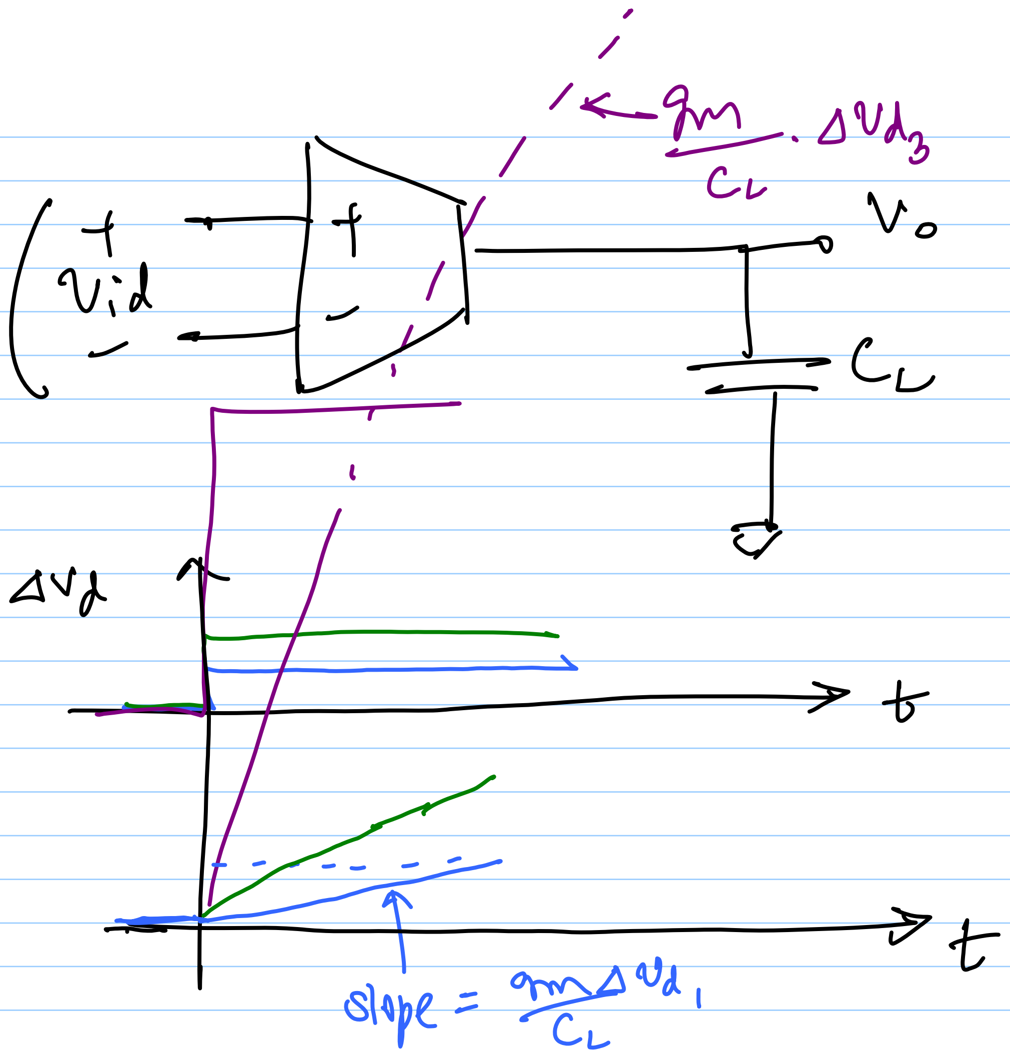
$100\,G_m \leftrightarrow \uparrow\left(\frac{W}{L}\right)$

$\downarrow$

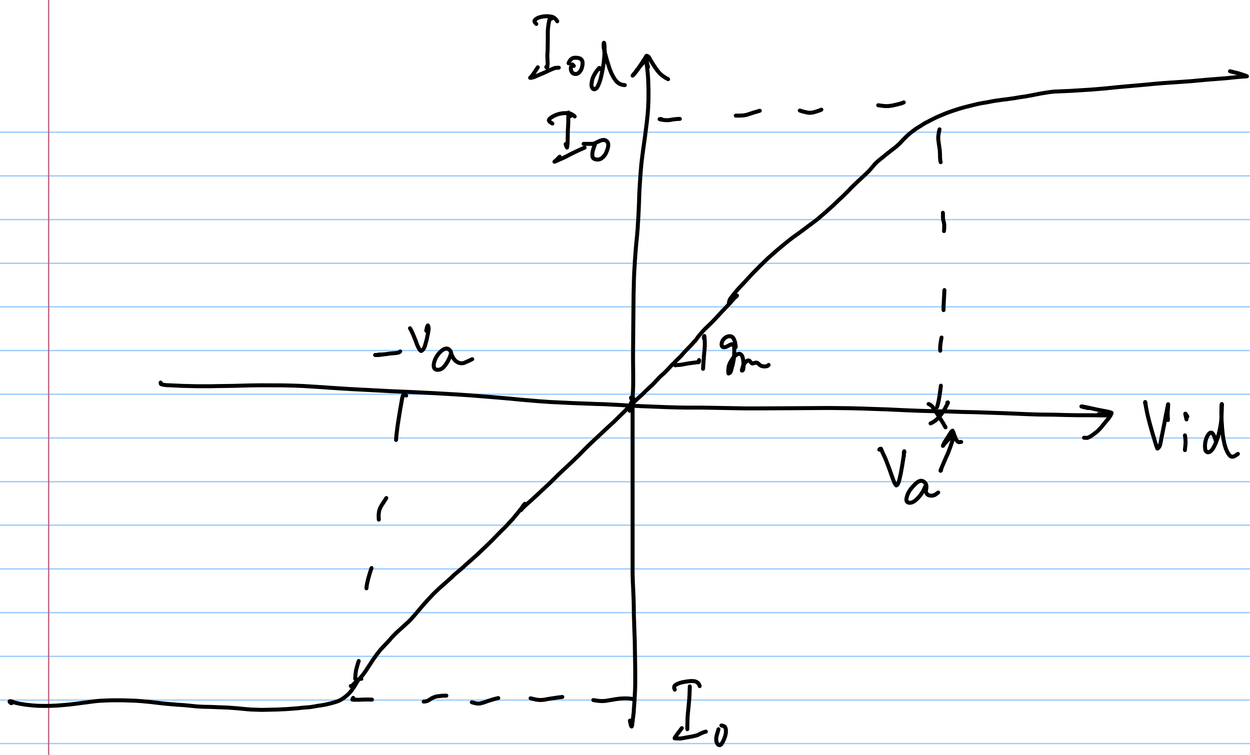
$100\,\omega_u$ $\times$

$$C_o = C_L + \underbrace{C_{par}}$$





$\frac{g_m}{C_L} \cdot \Delta v_{d_3}$
+
v_{id}
-
+
-
v_o
C_L
Δv_d
t
t
slope = $\frac{g_m \Delta v_{d_1}}{C_L}$



I_{od}
I_o
$-V_a$
g_m
V_{id}
V_a
I_o

4) +ve slew rate $= \dfrac{I_o}{C_L}$

-ve slew rate $= -\dfrac{I_o}{C_L}$