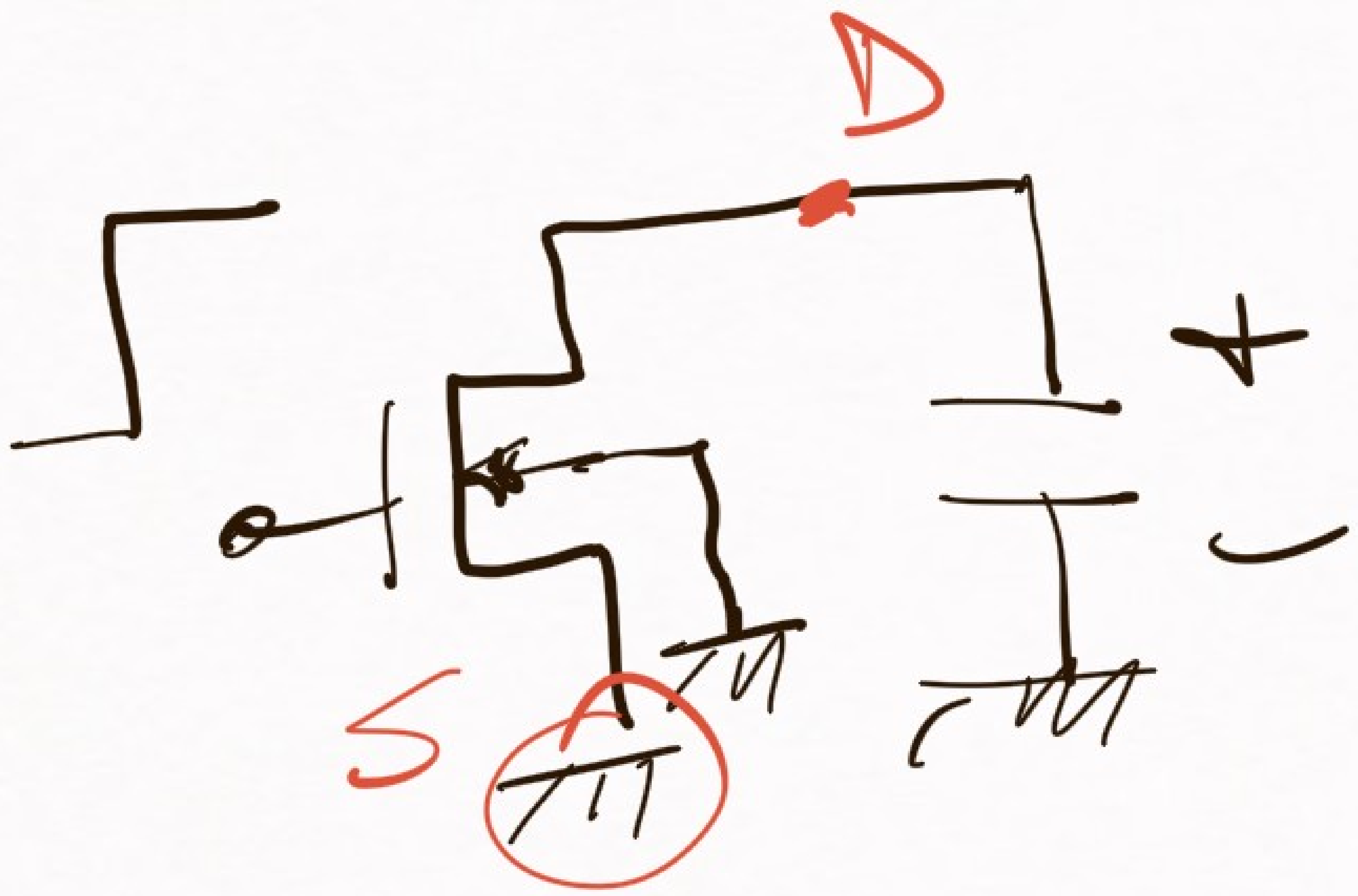
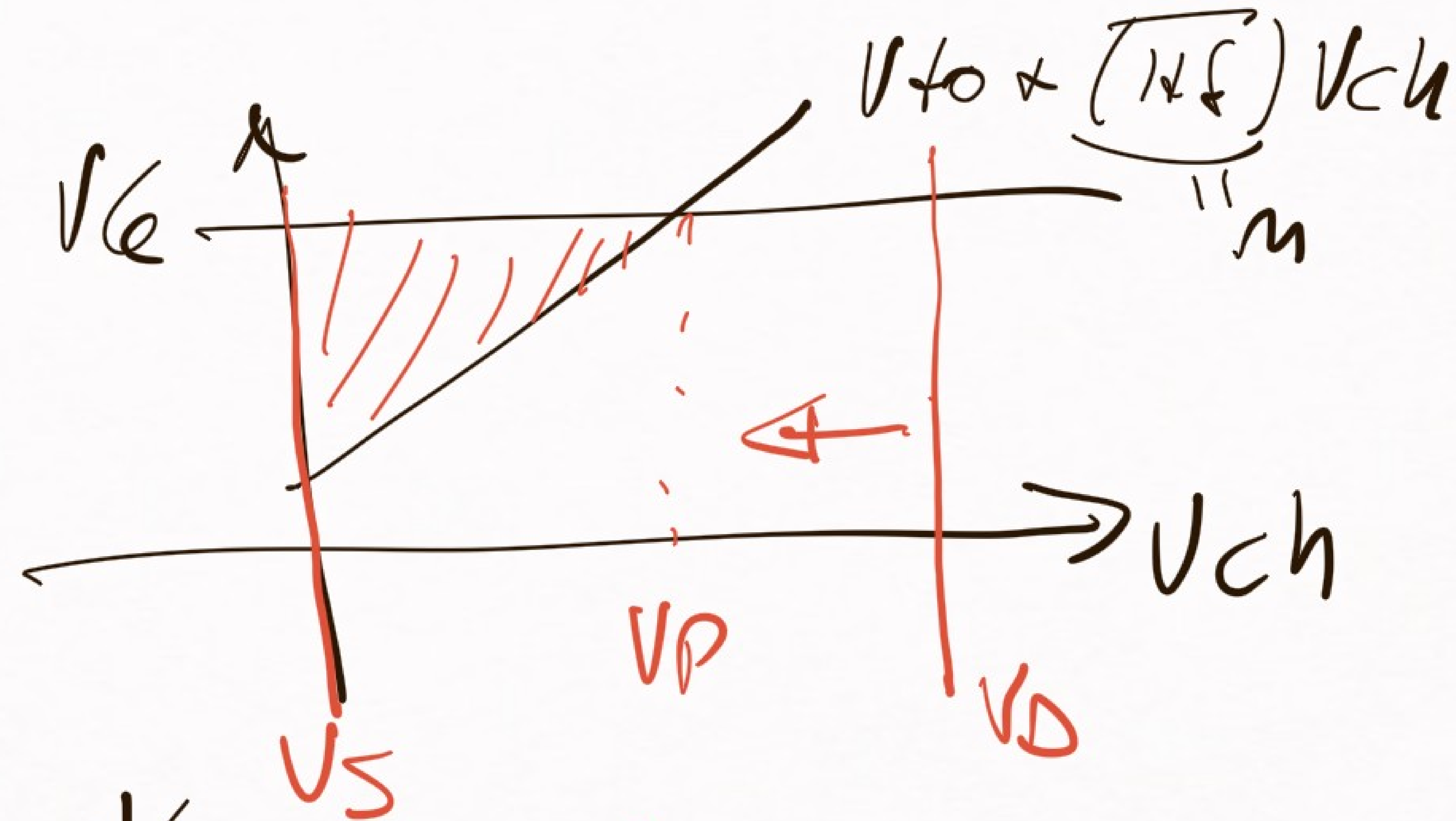
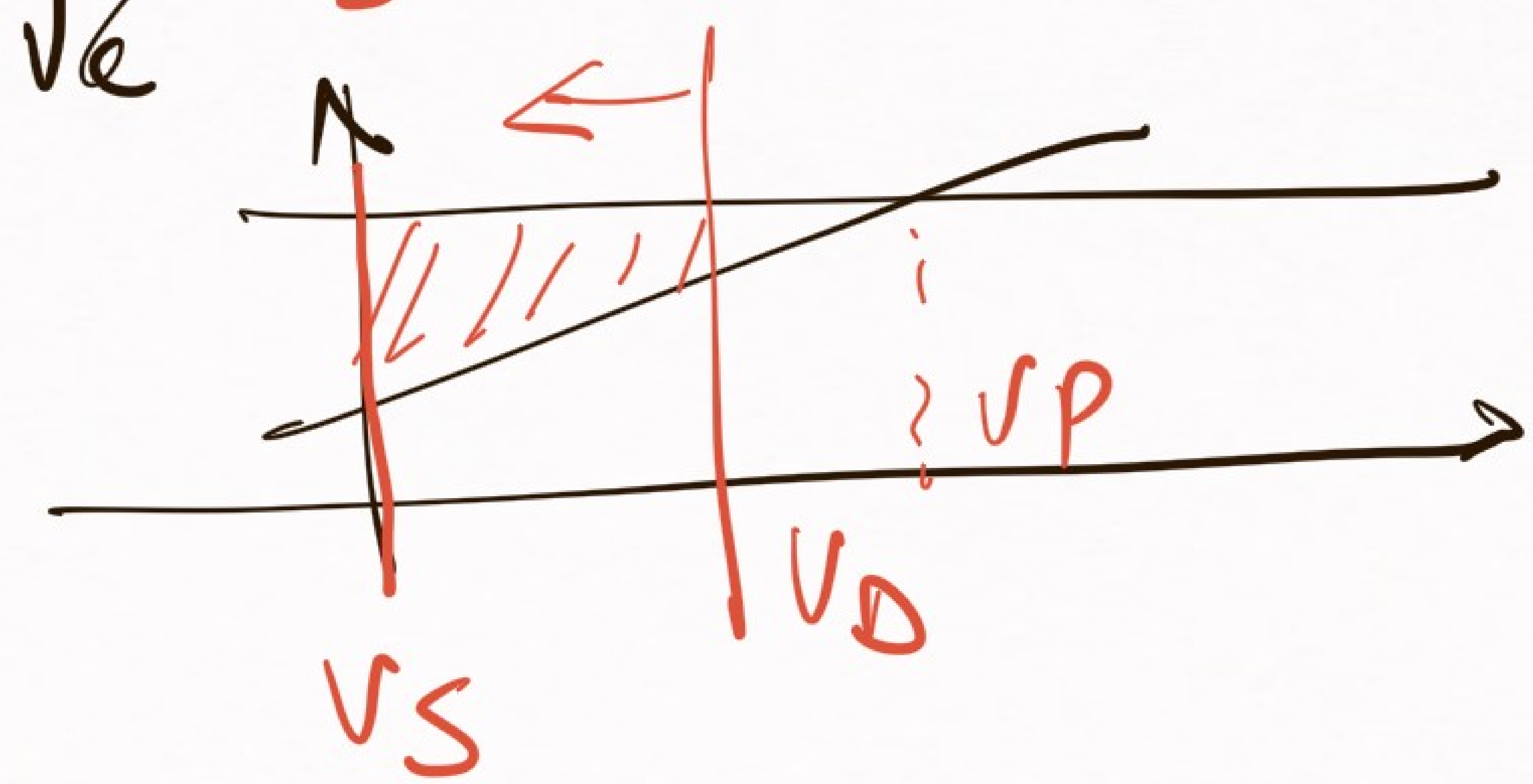
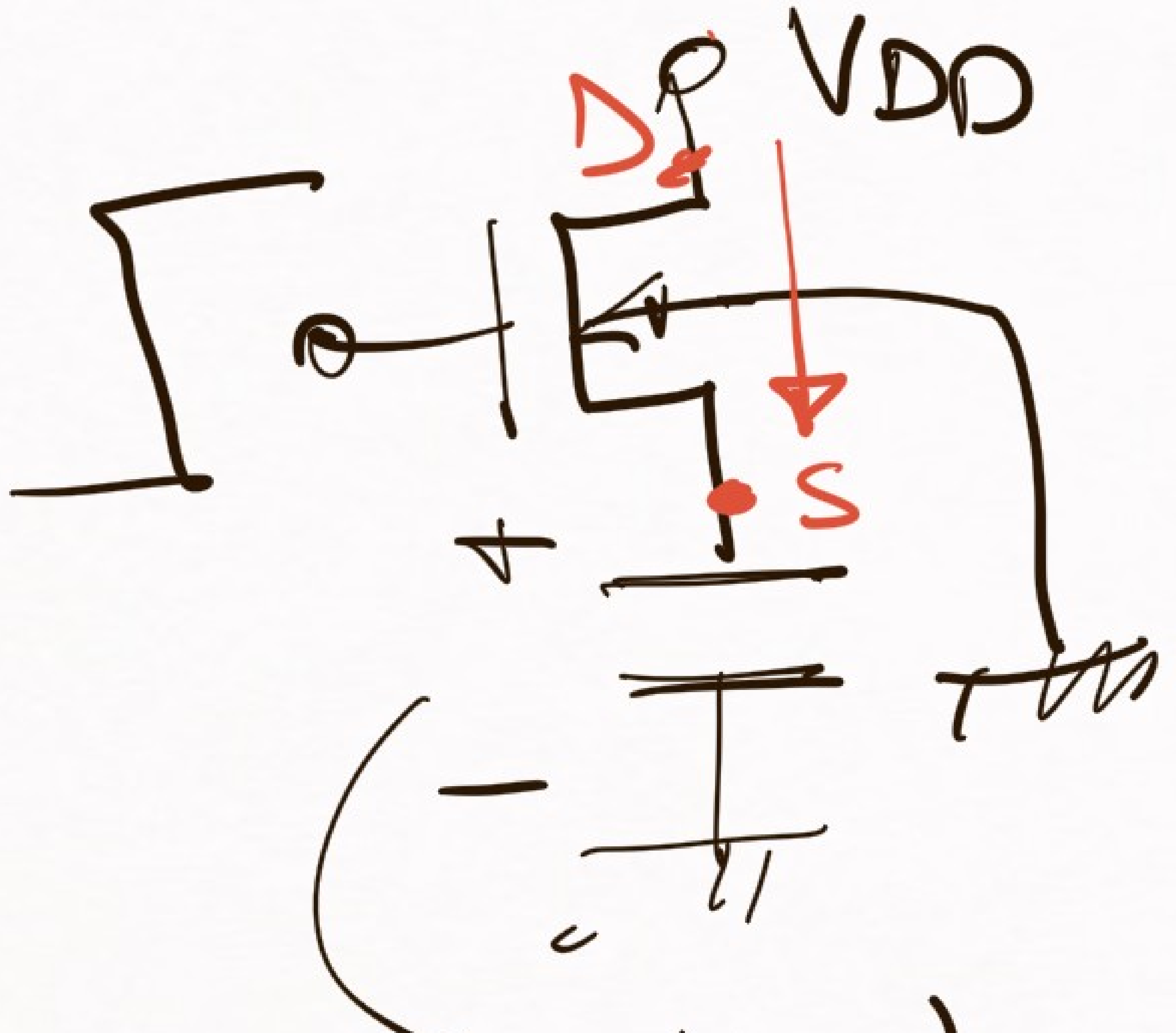
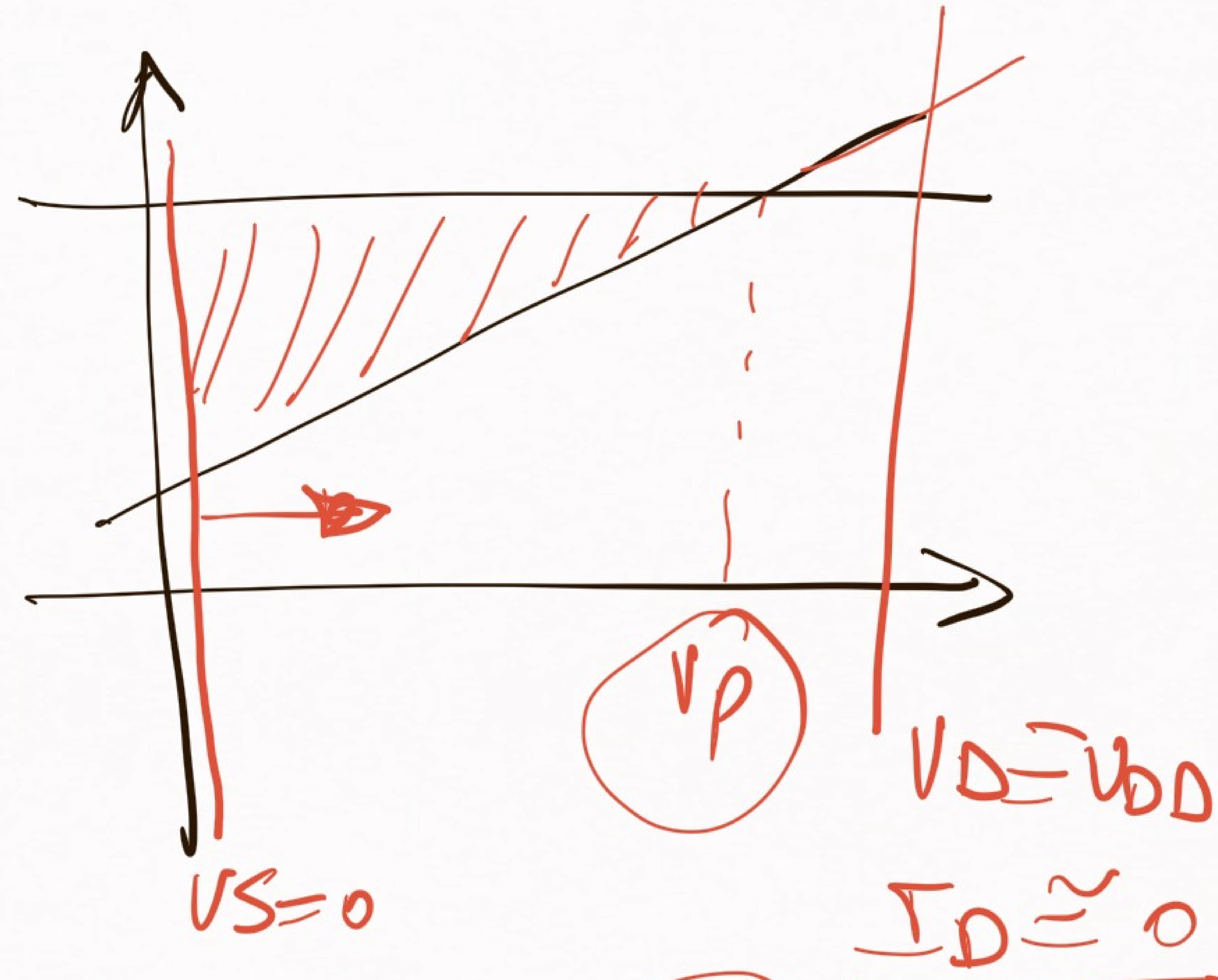

D
S
+
−

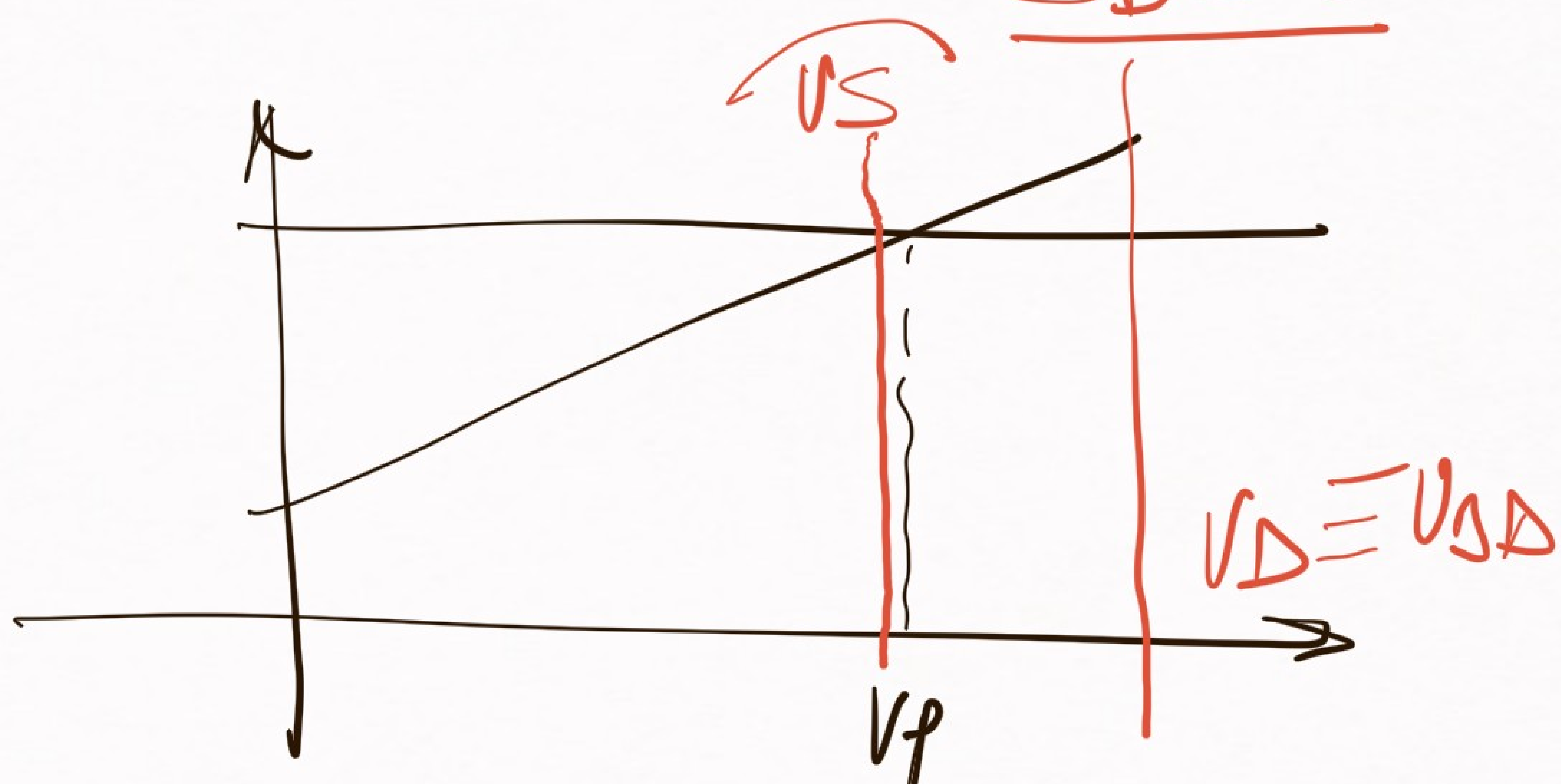

Vto + (1+f) Vch
= n
VG
Vch
VP
VD
VS


VG
VP
VD
VS

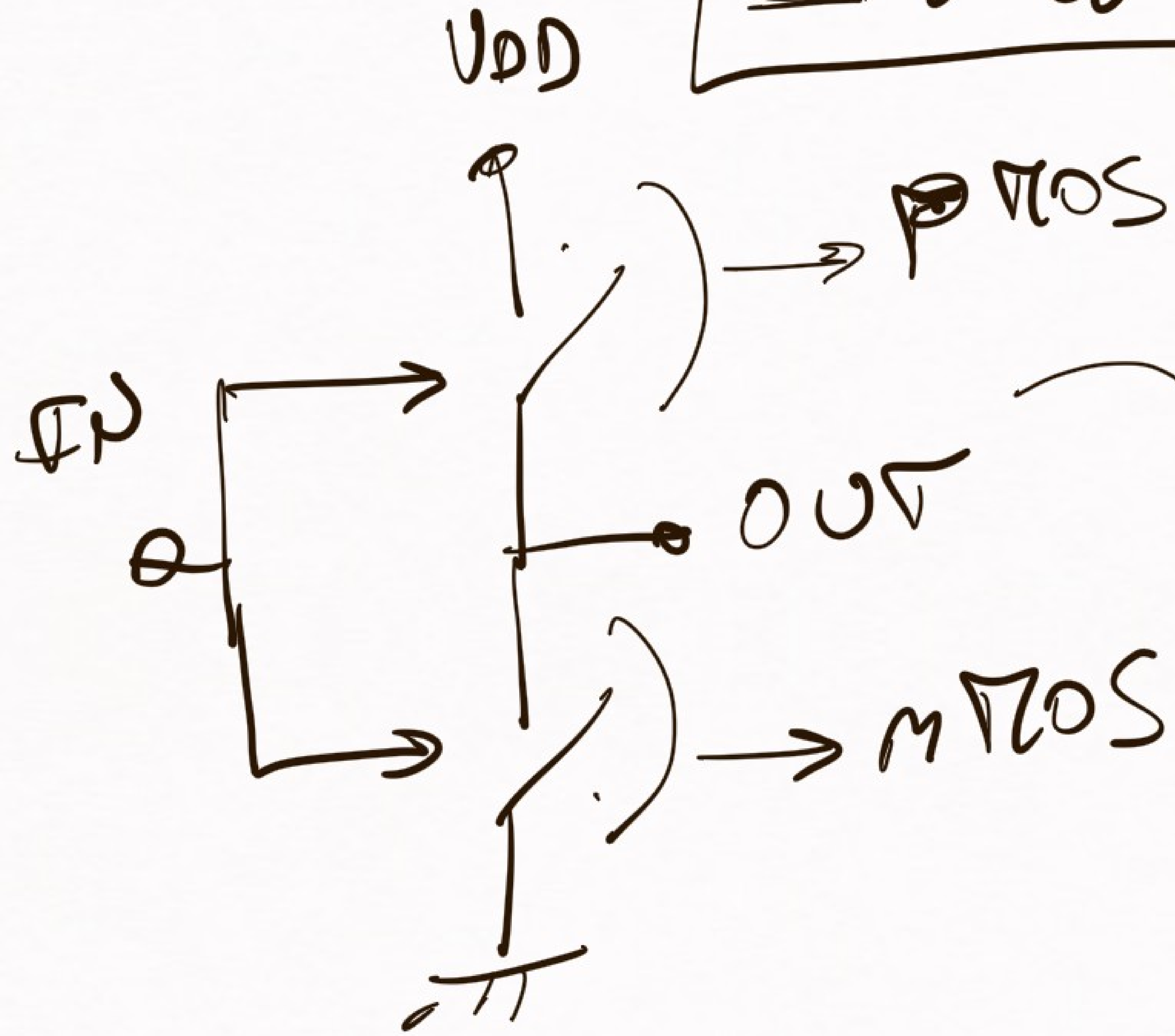


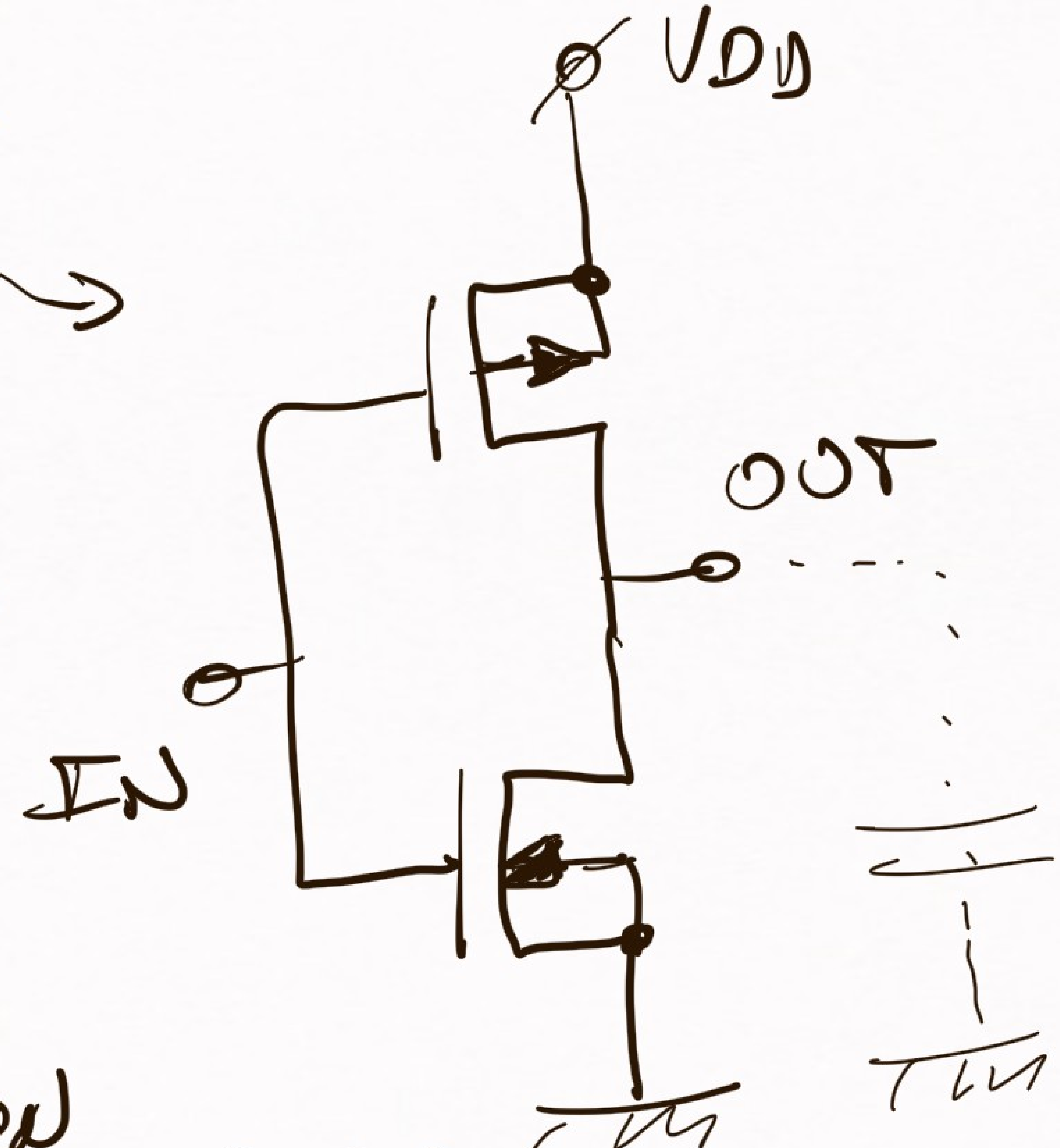
$V_C(t=0)=0$





Inversor CMOS

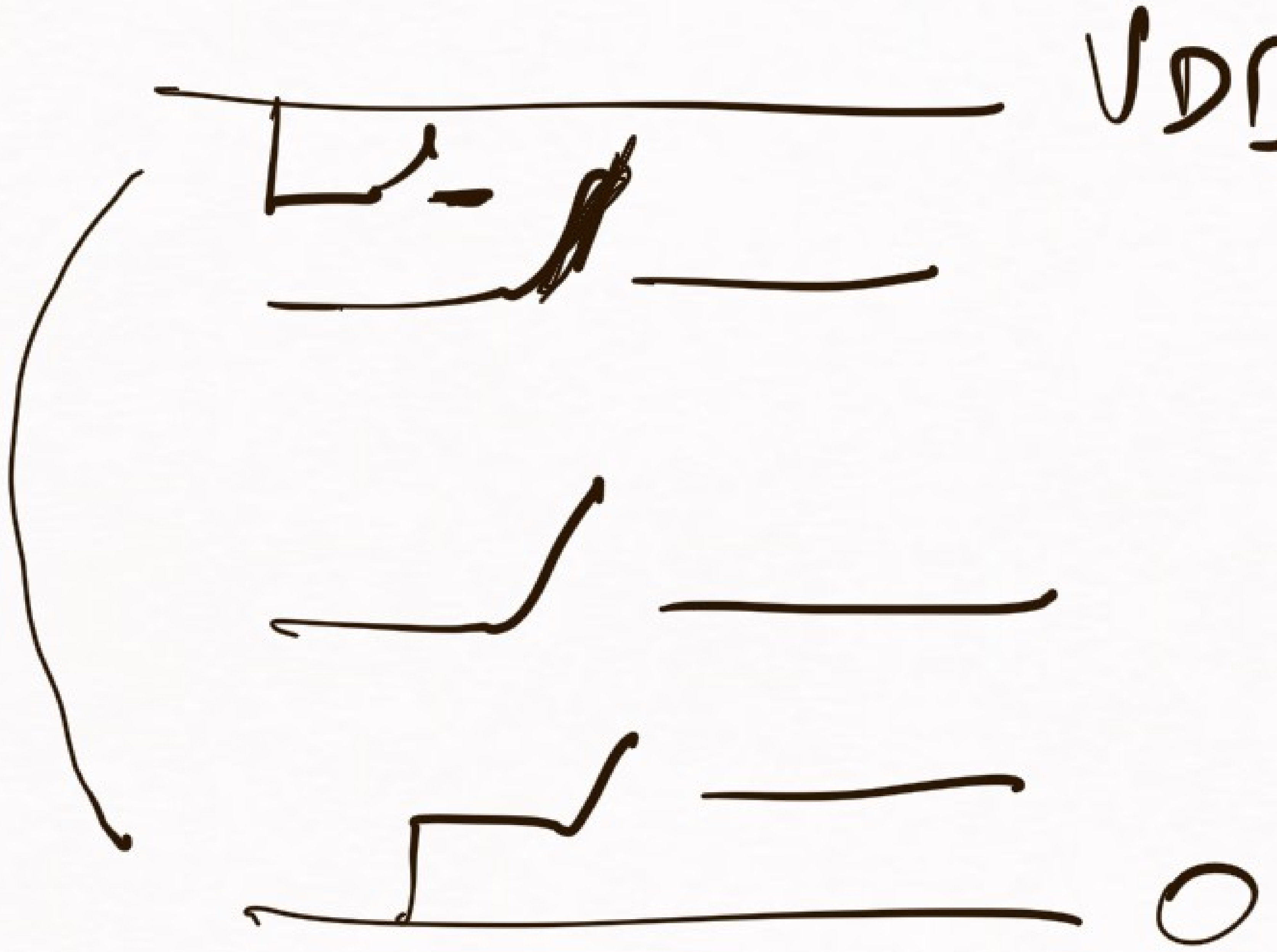




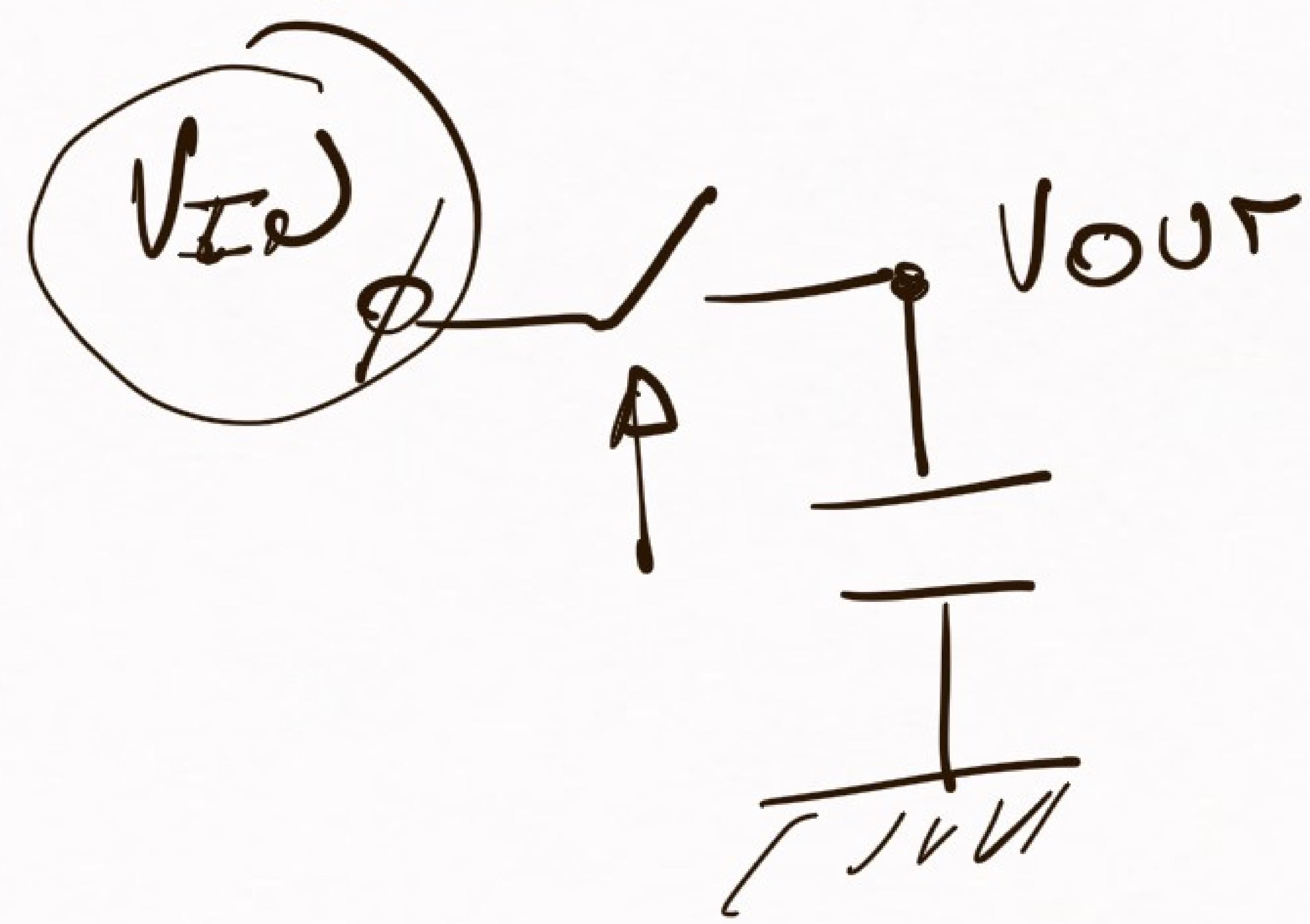
IN = VDD ⟹ nMOS ON
pMOS OFF → OUT = 0

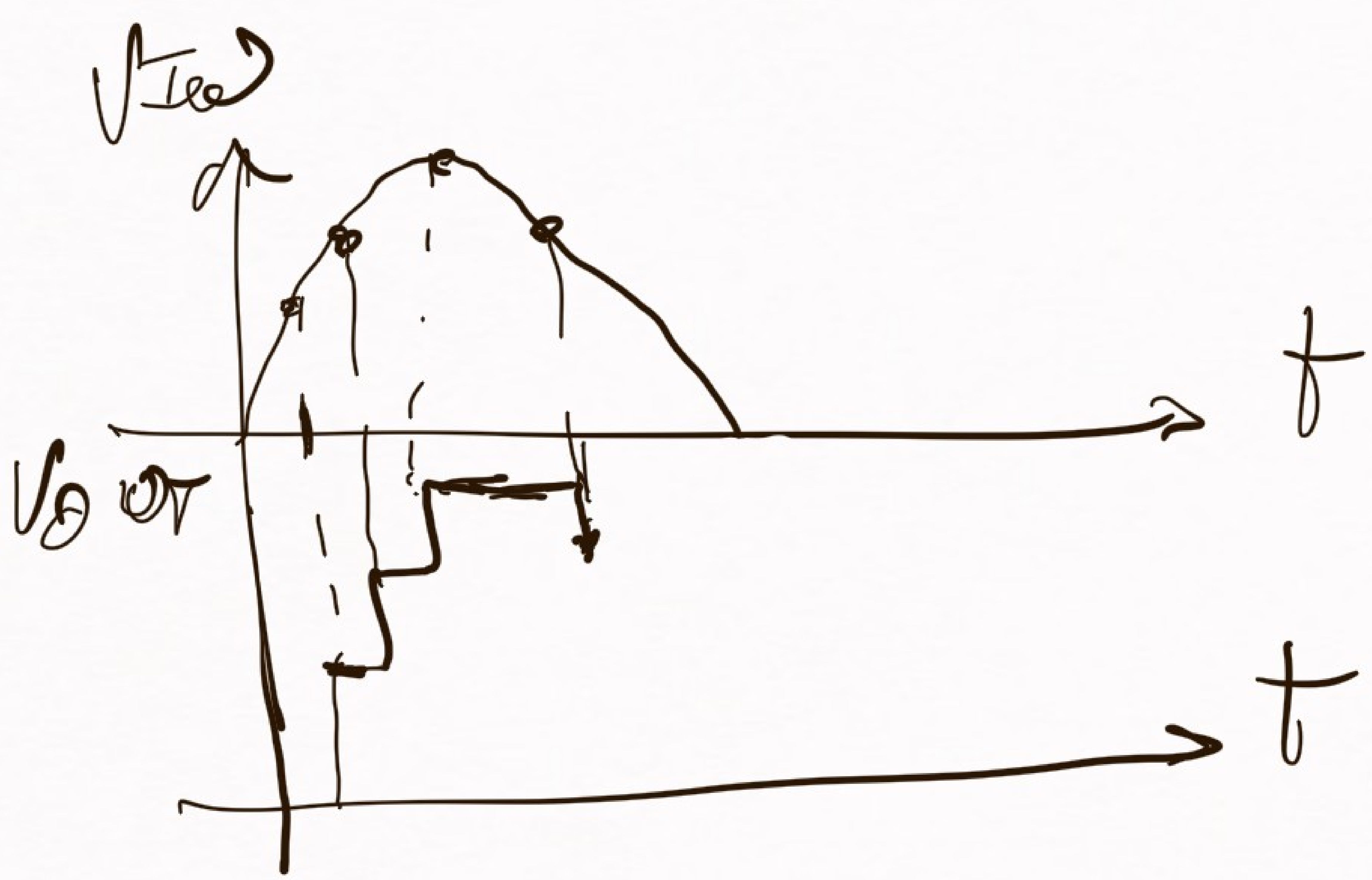
IN = 0 ⟹ nMOS OFF, pMOS ON ⟹ OUT = VDD

Llave analógica

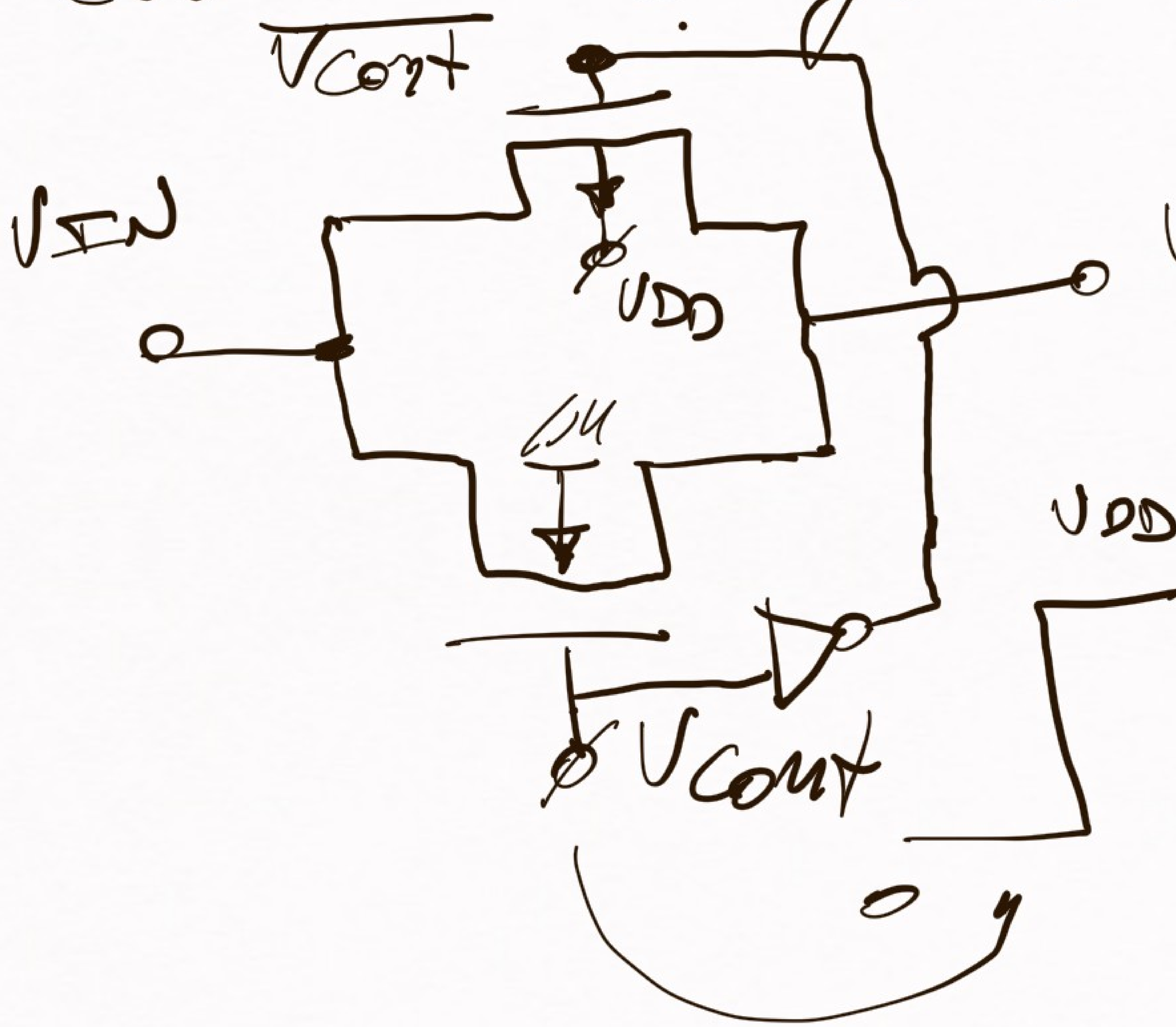


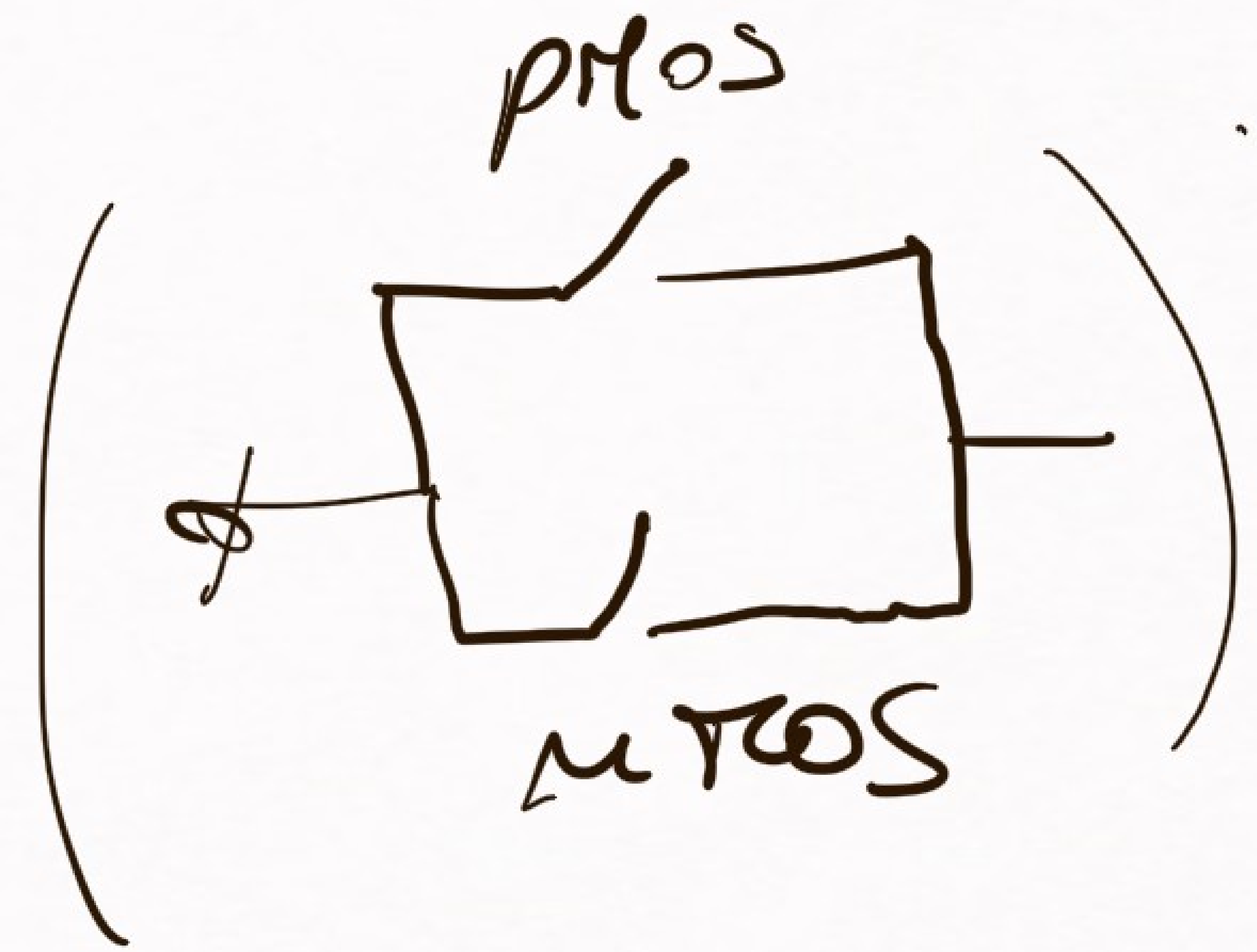
Sample & Hold





Chiave analogica





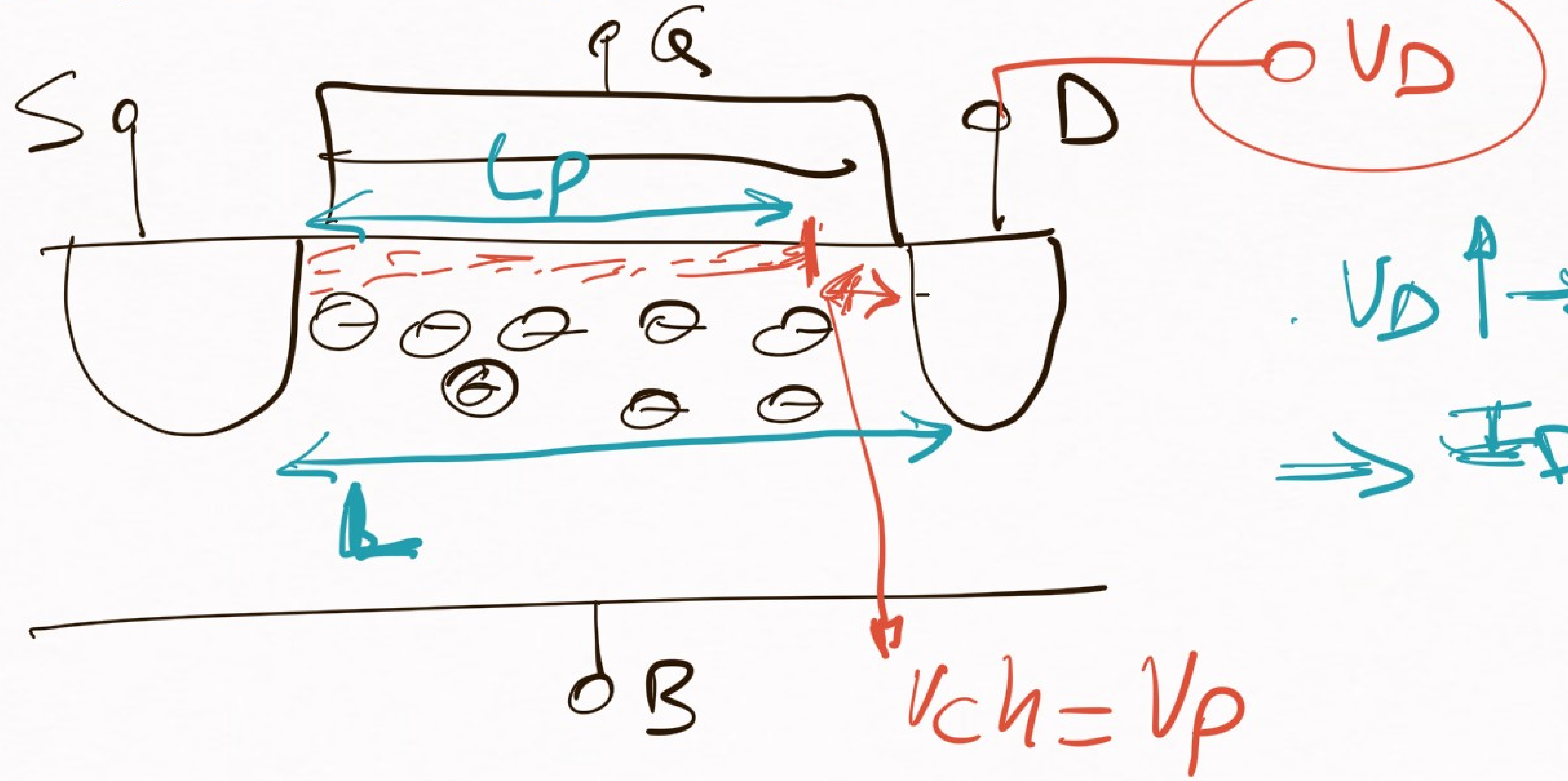
Efectos de 2do orden

1) Conductancia de salida no nula del transistor en saturación (Modulación de largo de canal)

2) Corriente subumbral.

Efecto de modulación de largo de canal.

Transistor en saturación

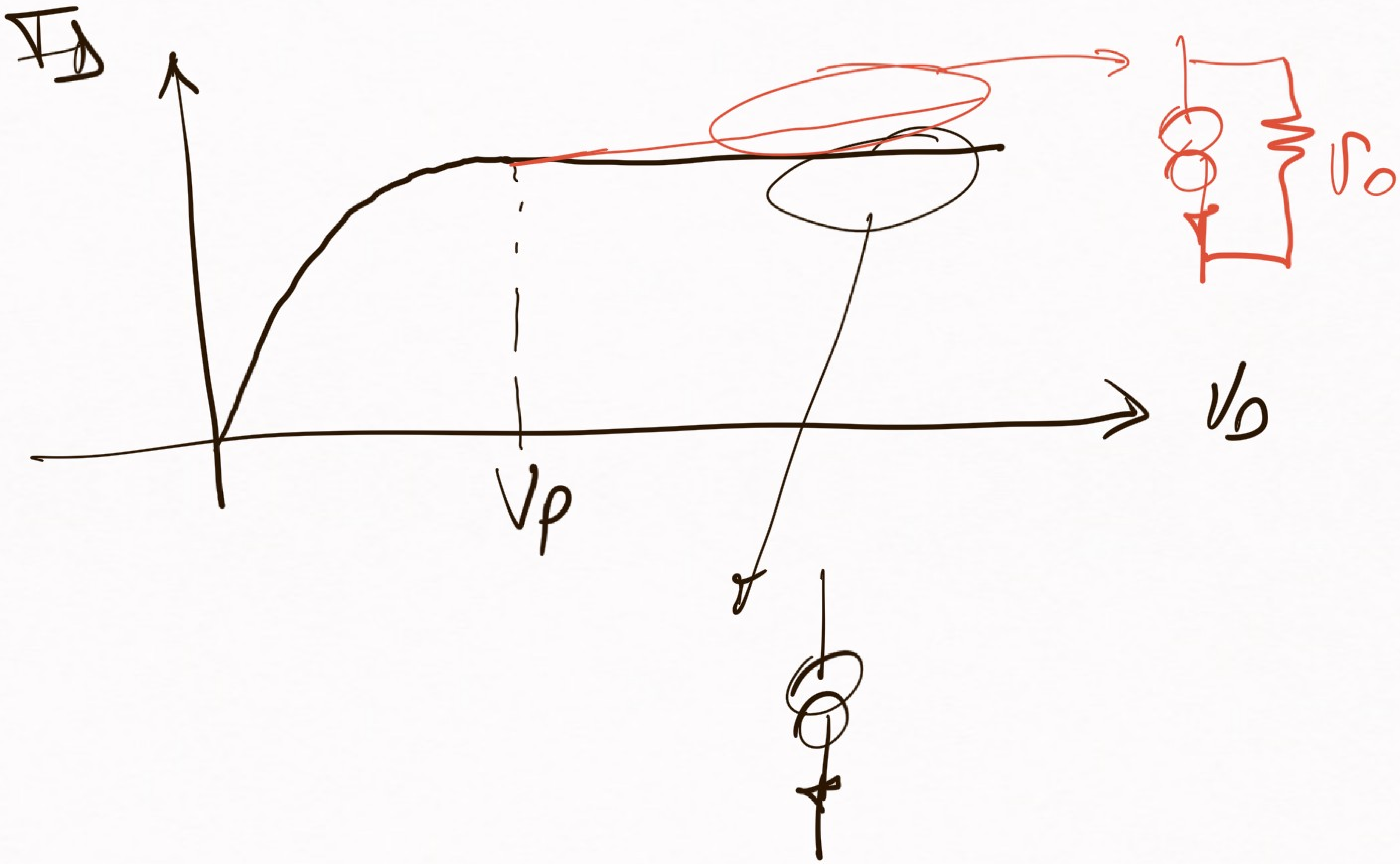


$V_D \uparrow \rightarrow L_p \downarrow$

$\Rightarrow I_{Dsat} \uparrow$

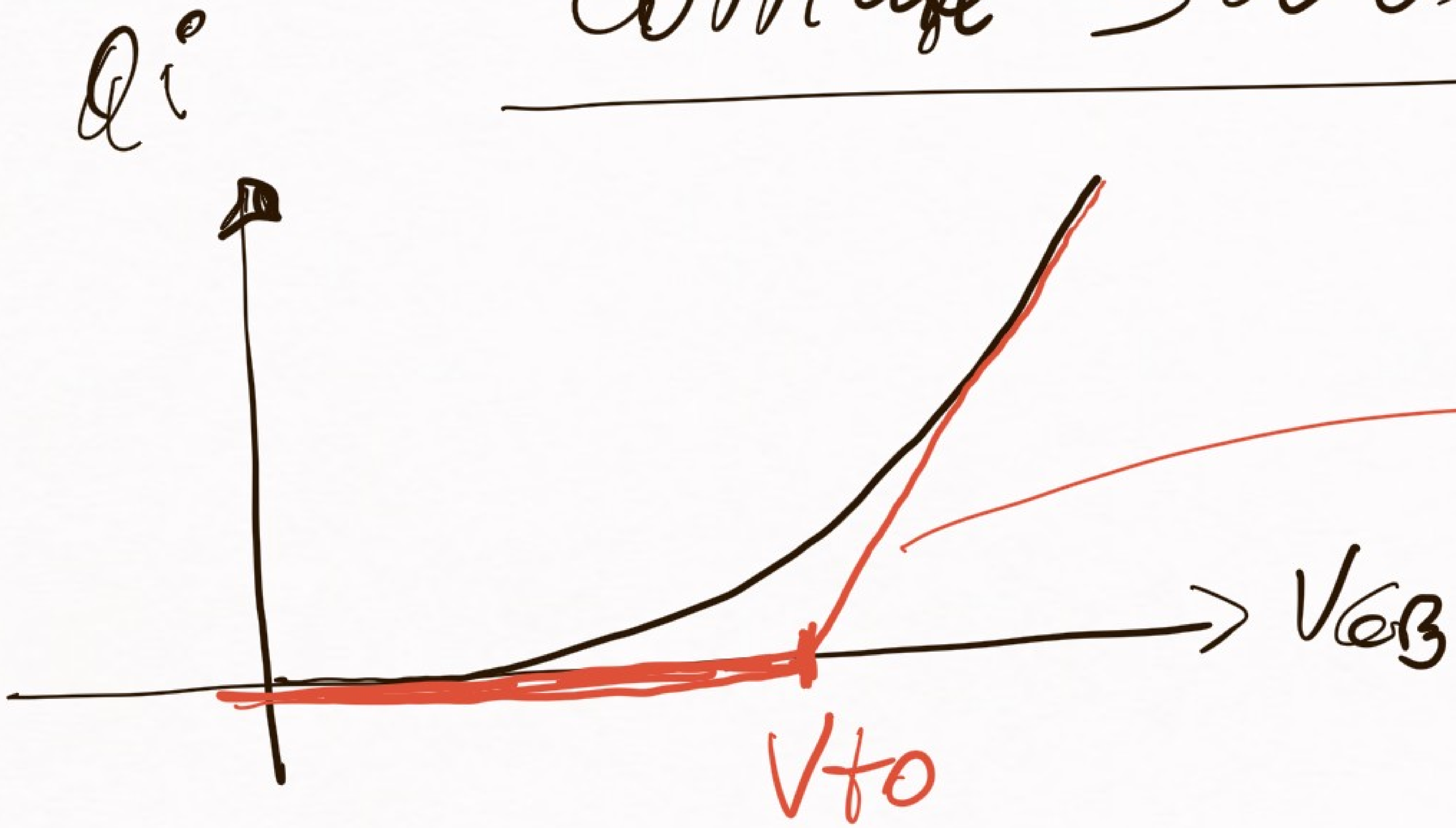
$$I_{Dsat} = I_{D\,lin}\Big|_{V_D = V_p} = \mu \cdot C_{ox} \cdot \frac{W}{L} f(V_{GB}, V_{SB}, V_{DB})$$

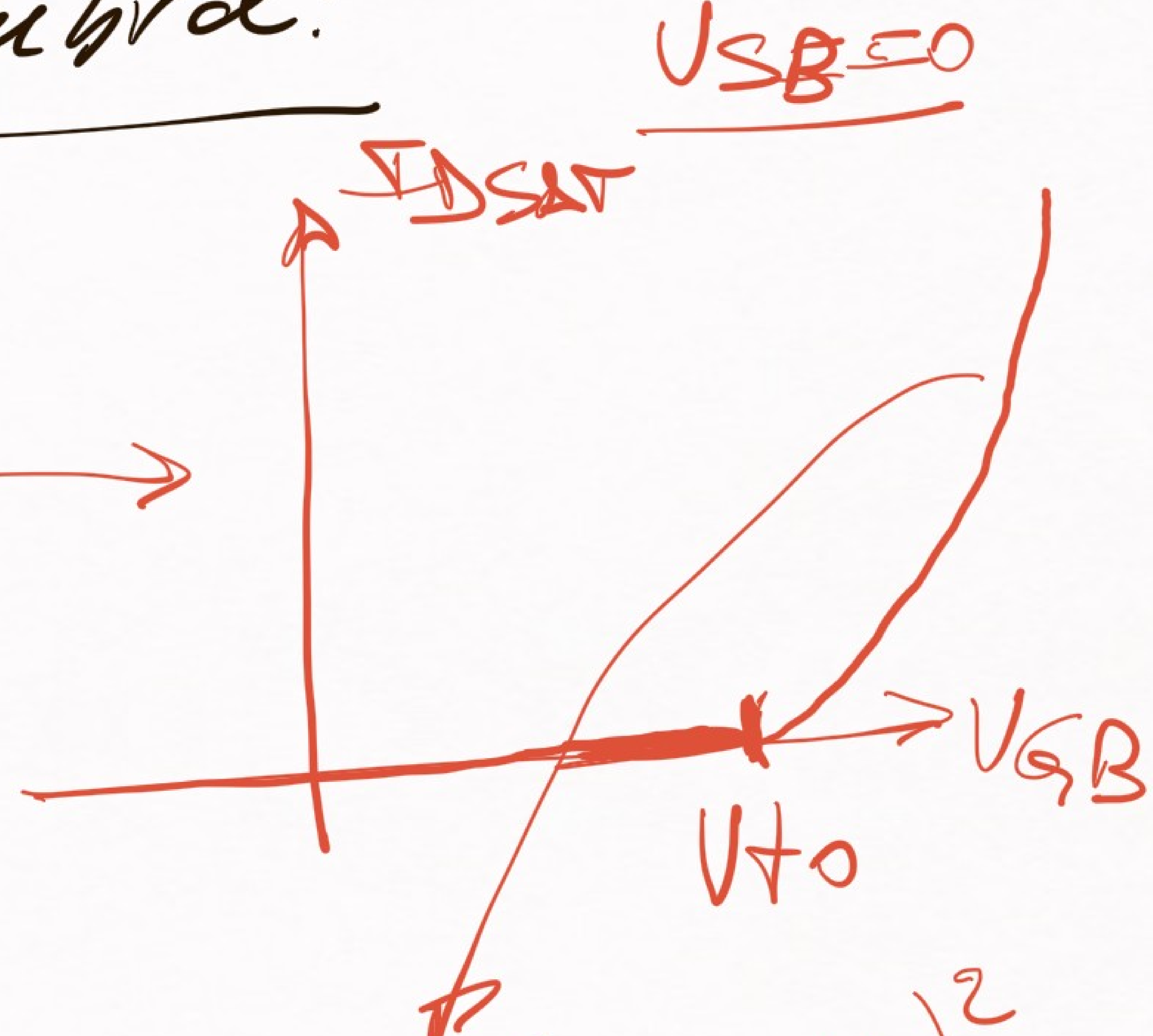
($V_{DB} \rightarrow V_p$; $L \leftarrow L_p$)



ID
VD
Vp
ro

Corriente subumbral:





$$I_D = \frac{\beta}{2(1+\delta)}\left(V_{GB} - V_{to}\right)^2$$

Modelo de pequeña señal.

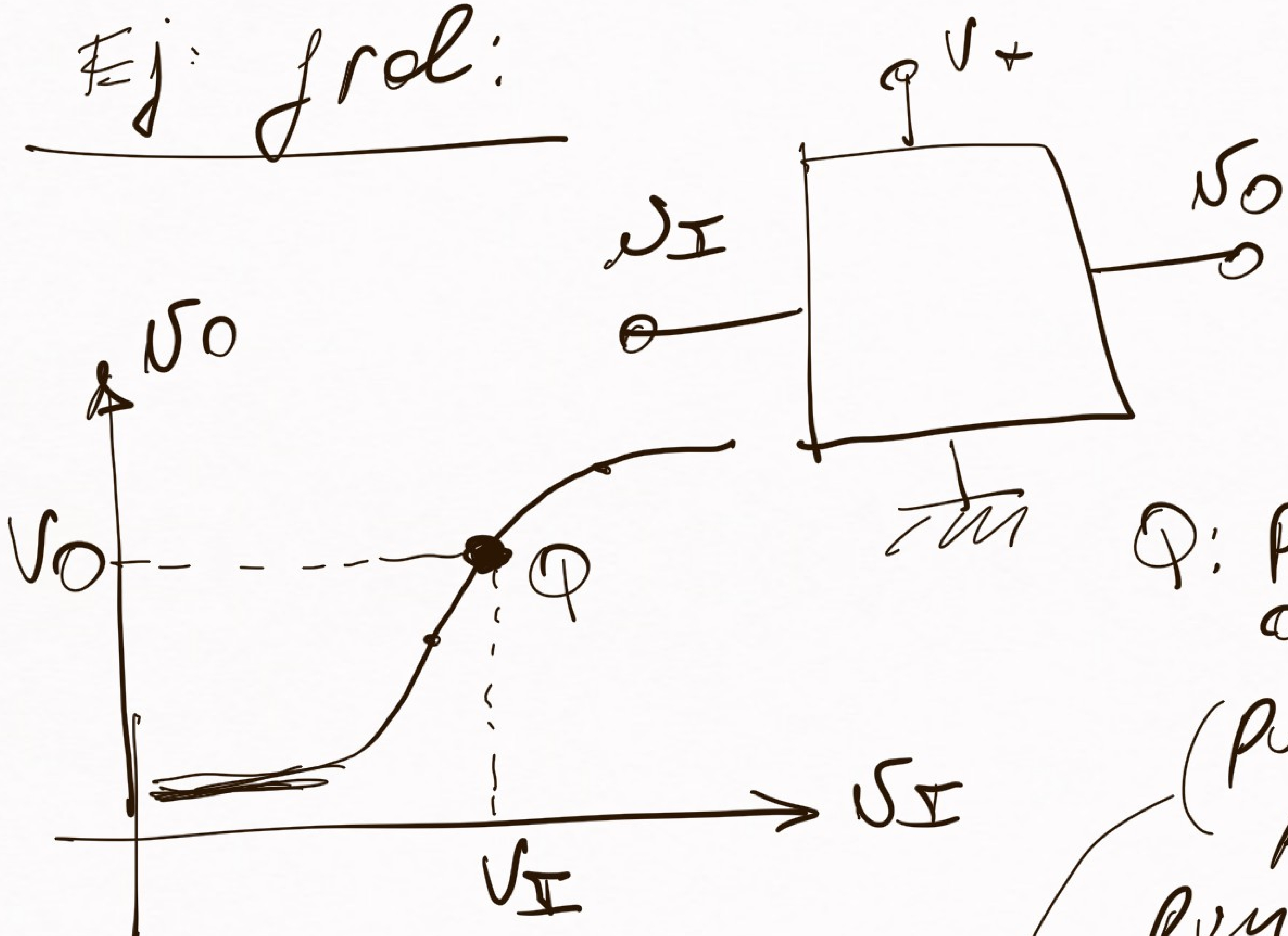
1) Idea grol 2) Aplic. sencillo al transistor MOS

3) Modelo de peq. señal del tr. MOS en un caso general.

⊗ Dispositivo no lineal operando con pequeñas variaciones (de AC) en torno a un punto fijo de su característica.

⟹ Método para aproximar con caract. lineal este caso...

Ej: gral:

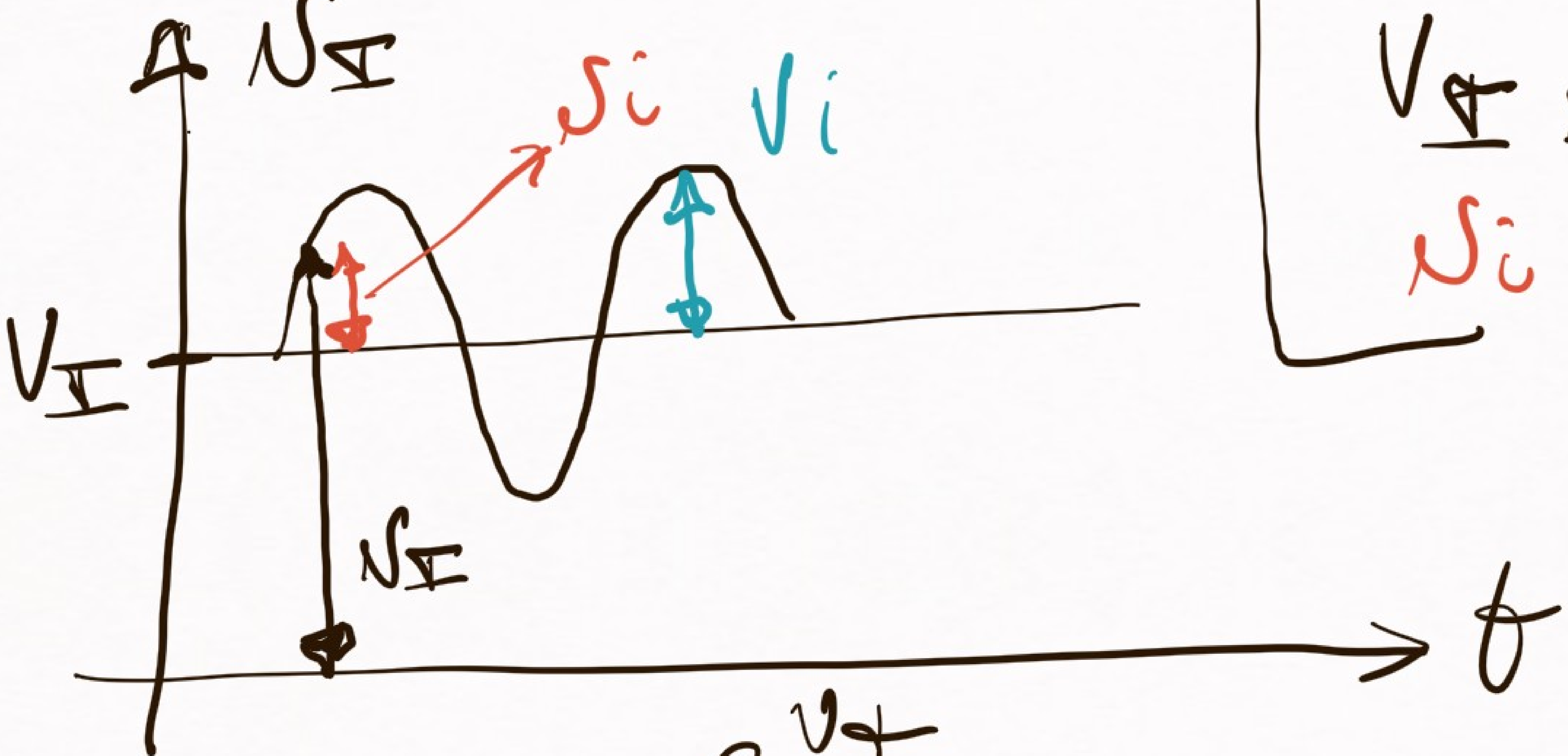


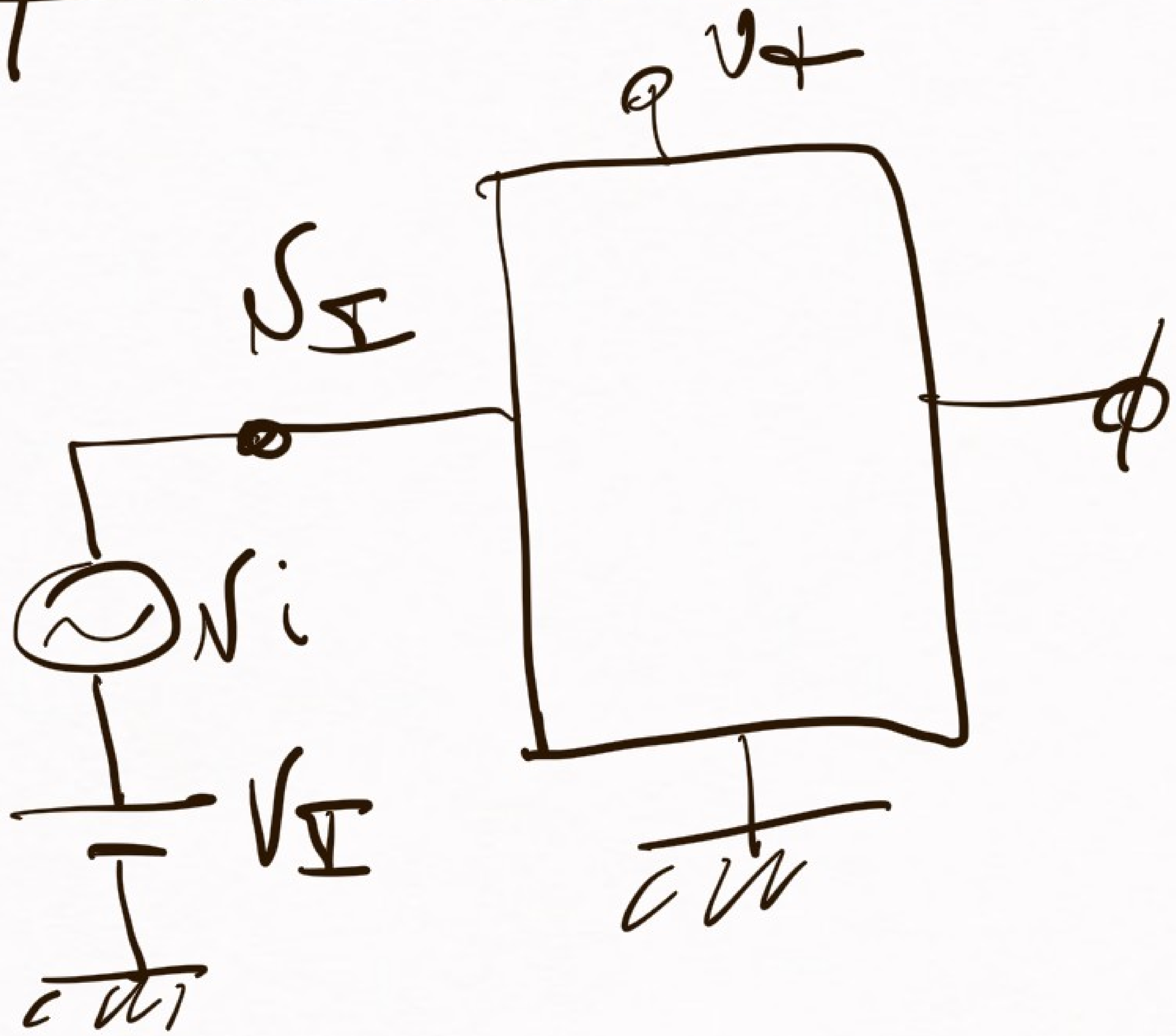
Q: punto de operación ó
(punto de polarización)
punto de reposo
"bias point"

Nomenclatura:

- v_I : señal total
- V_I : DC
- v_i : AC

(V_i : amplitud de AC)





$$v_O = V_O + v_o(t)$$