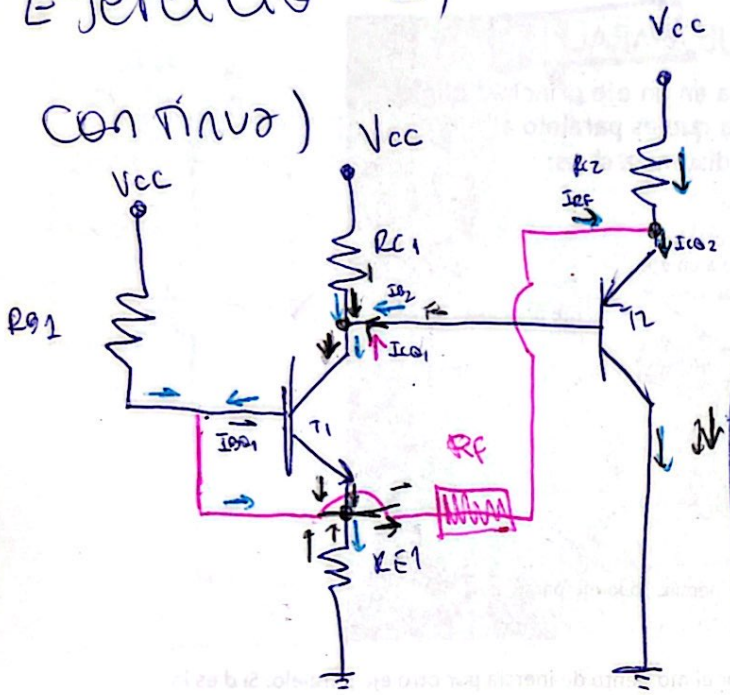
Parcial 22/11/19

Ejercicio 1) a)

(continúa)



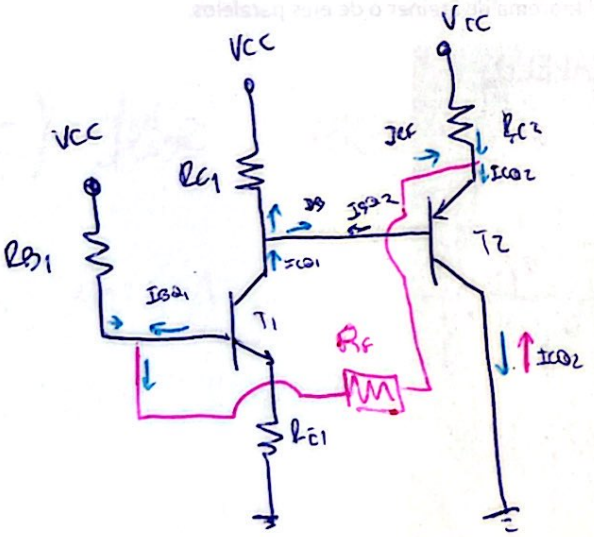
$\beta_1 \uparrow \Rightarrow I_{CQ_1} \uparrow$

$\Rightarrow I_{CQ_1} \downarrow$

$\beta_1 \uparrow \rightarrow I_{CQ_1} \uparrow \rightarrow I_{B2} \uparrow$

$\rightarrow I_{CQ_2} \uparrow \rightarrow I_{ref} \uparrow \rightarrow$

$\rightarrow I_{BQ_1} \downarrow \rightarrow I_{CQ_1} \downarrow$



$\beta_2 \uparrow \; I_{CQ_2} \uparrow$

$\Rightarrow I_{CQ_2} \downarrow$

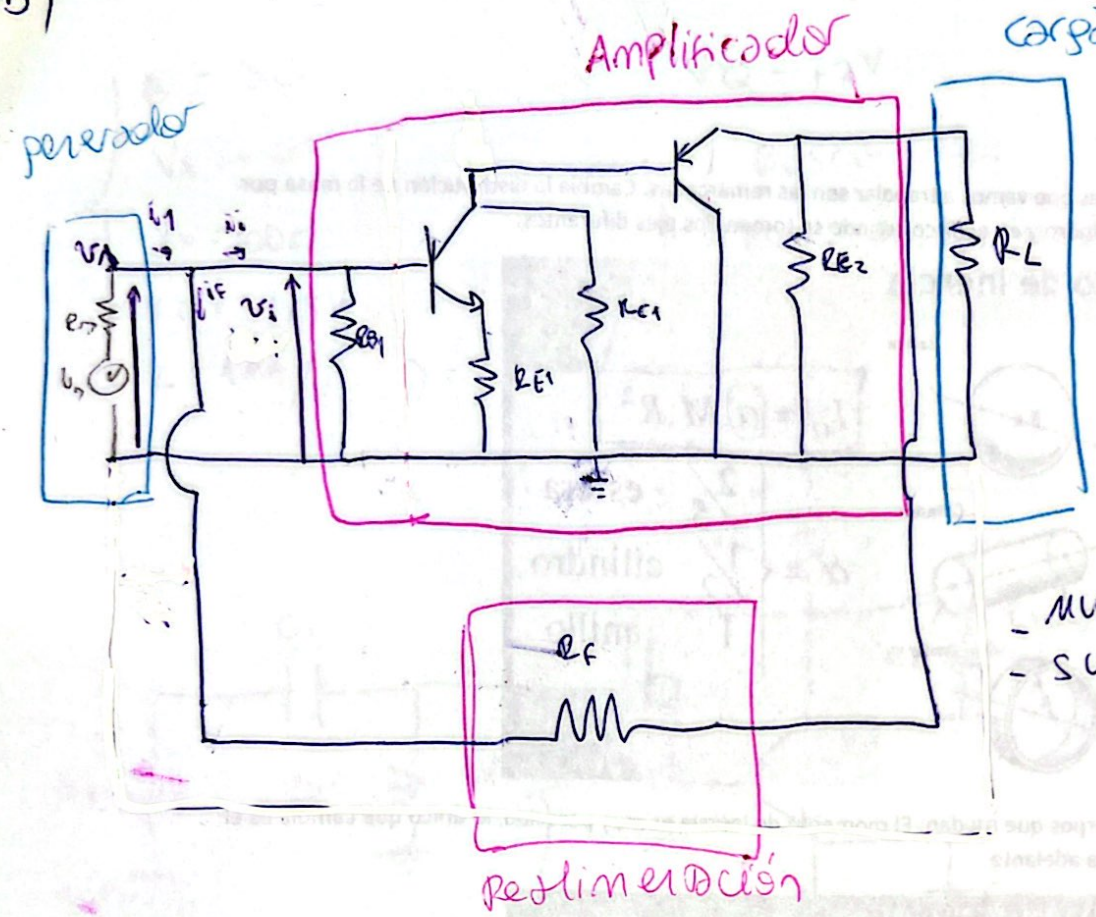
$\beta_2 \uparrow \rightarrow I_{CQ_2} \uparrow \rightarrow I_{ref} \uparrow \rightarrow$

$\rightarrow I_{BQ_1} \uparrow \rightarrow I_{CQ_1} \uparrow \rightarrow$

$\rightarrow I_{BQ_2} \downarrow \rightarrow I_{CQ_2} \downarrow$

Se estabiliza

b)



- muestrea tensión
- suma corriente

c) debe conectarse en el emisor de T_1

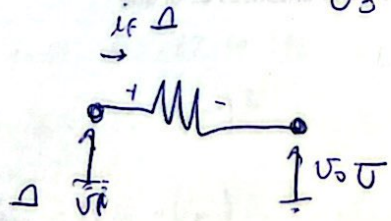
$A_v = A_{v1} \cdot A_{v2}$

etapa 1 → EC

etapa 2 → CC

$A_{v1} < 0$ } $A_v < 0$
$A_{v2} > 0$

K? $K = \frac{i_f}{v_o} \Rightarrow K < 0$ (realimentación negativa)



i_i

$v_i \downarrow \Rightarrow v_o \uparrow$

$\Rightarrow i_f \downarrow \Rightarrow i_i = i_1 - i_f \uparrow$

si conecto en emisor y se mide la entrada desde ahí → $A_{v1} > 0$ (base común) → $A_v > 0$ (realimentación positiva)

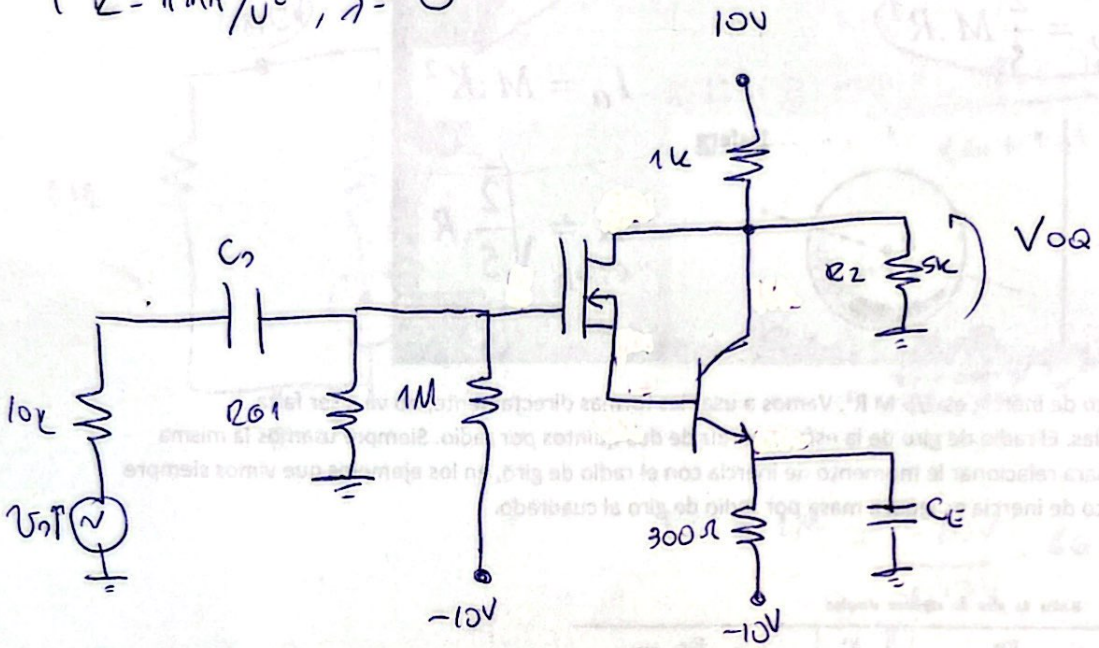
Ejercicio 2)

$\beta = 50$
$V_A \to \infty$
$r_x = 100\Omega$
$V_T = -1{,}5V$
$K = 1mA/V^2$, $\lambda = 0$

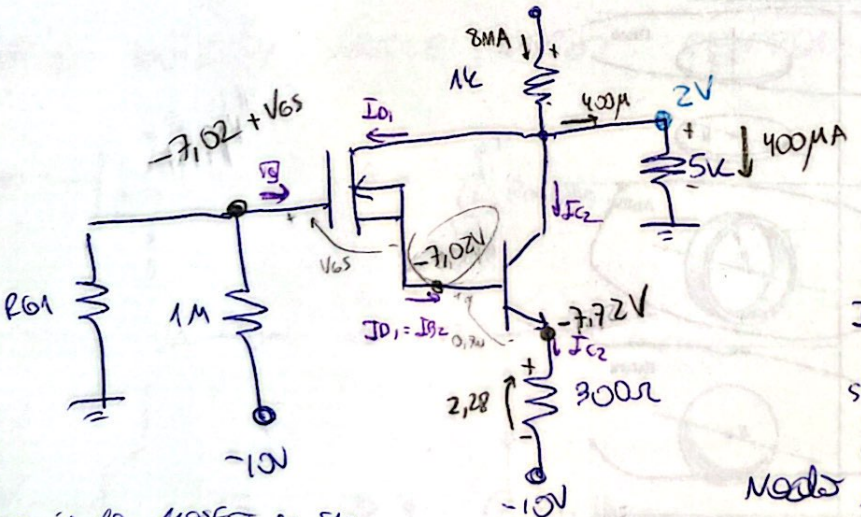
$V_{DQ} = +2V$

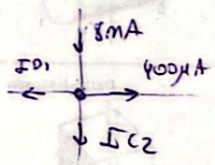
a) Busco R_{G1}

b) Busco R_i, R_o, A_V, A_{Vs}



circuito en continua) ②





$I_{C2} = \beta I_{B2} = \beta I_{D1}$

suponiendo TBJ en MAD

suponiendo MOSFET en SAT

$I_{D1} = K(V_{GS} - V_T)^2$

$\sqrt{\frac{I_{D1}}{K}} = |V_{GS} - V_T|$

$V_{GS} = \sqrt{\frac{I_{D1}}{K}} + V_T = -1{,}1V$

$V_{GS} = -\sqrt{\frac{I_{D1}}{K}} + V_T = -1{,}9V$

Nodo)

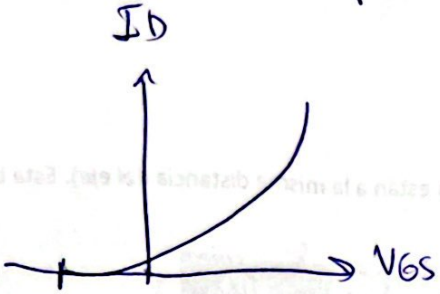
$8mA = 400\mu A + I_{D1} + I_{C2}$

$8mA = 400\mu A + I_{D1} + \beta I_{D1}$

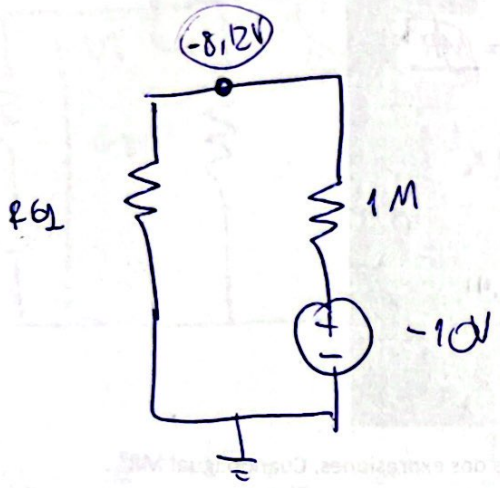
$I_{D1} = \frac{8mA - 400\mu A}{\beta + 1} = 149\mu A$

$I_{C2} = 7{,}6mA$

MOSFET canal n preformado



Me quedo con $V_{GS} = -1,1V$ porque $V_{GS} > V_T$



$$-8,12V = -10V \cdot \frac{R_{G1}}{R_{G1}+1M}$$

R_{G1} 1MΩ = ~~10V~~ R_{G1} 1M
~~8,12V~~

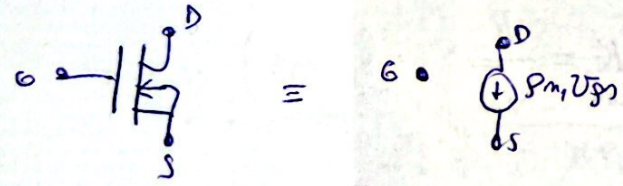
$$R_{G1} + 1M = \frac{-10V}{-8,12V} \cdot R_{G1}$$

$$\frac{1M}{\frac{10V}{8,12V} - 1} = \boxed{R_{G1} = 4,3M}$$

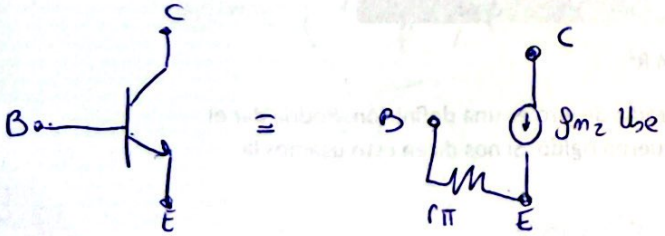
(b) con $\lambda = 0$

$r_{ds} \to \infty$

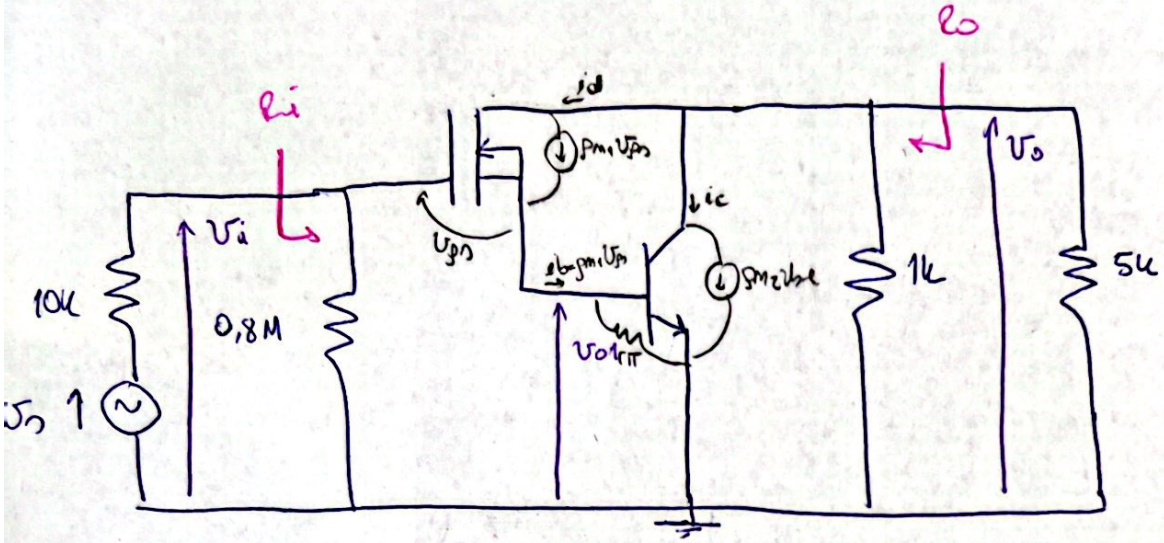
como bulk y source están cortocircuitados → $V_{bs} = 0$



como $V_A \to \infty \Rightarrow r_o \to \infty$



Arwin & Seidl)



$$A_{V1} = \frac{v_{o1}}{v_i} = \frac{v_o}{v_o + v_{gs}} = \frac{g_{m1} v_{gs} \cdot r_\pi}{g_{m1} v_{gs} r_\pi + v_{gs}} = \frac{g_{m1} r_\pi}{g_{m1} r_\pi + 1}$$

etapa 1 : drain común

$$A_{V2} = \frac{v_o}{v_{o1}} = \frac{v_c}{v_b} = \frac{-(i_c + i_d)(1k \parallel 5k)}{v_{be}} =$$

etapa 2: emisor común

$$= \frac{-\left(g_{m2} v_{be} + \frac{g_{m2} v_{be}}{\beta}\right)(1k \parallel 5k)}{v_{be}} =$$

$$= -g_{m2}\left(1 + \underbrace{\frac{1}{\beta}}_{\simeq 1}\right)(1k \parallel 5k) \simeq -g_{m2}(1k \parallel 5k)$$

$$A_V = A_{V1} \cdot A_{V2} = -\frac{g_{m1} r_\pi}{1 + g_{m1} r_\pi} * g_{m2}(1k \parallel 5k)$$

$R_i = 0{,}8 M\Omega$

$R_o = 1k\Omega$

$$A_{Vs} = A_V \cdot \frac{R_i}{R_i + 10k}$$