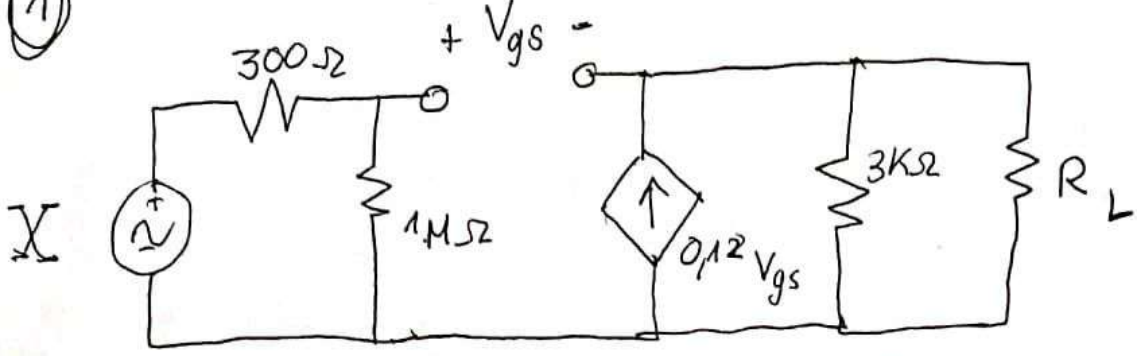
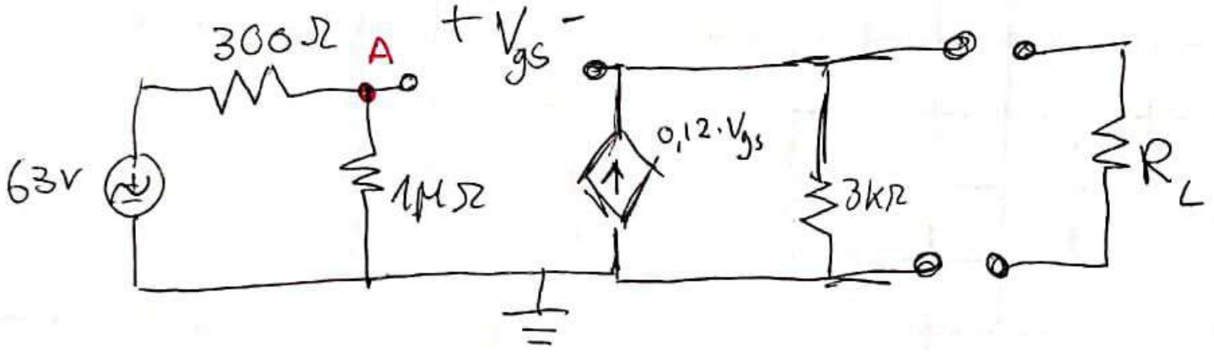
ID: 20446653

(1)

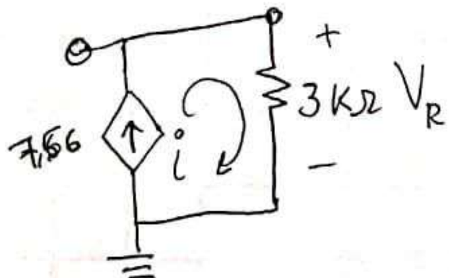


- Encuentre el valor R_L para que P sea máxima
- Encuentre P.

$X = 63\ V$



$$V_A = 63V \cdot \frac{1M\Omega}{300\Omega + 1M\Omega} = 63V \cdot \frac{1\times10^6}{300 + 1\times10^6} = 62,98\ V$$



~~→ 0,12 · 62,98 = 7,56A~~

~~$V_R = (7,56A)(3\times10^3\Omega)$~~

~~$V_R = 22680\ V$~~

$V_R = (0,12 V_{gs})(3\times10^3) = 360\ V_{gs}$ → $V_{gs} = \frac{62,98}{361}$

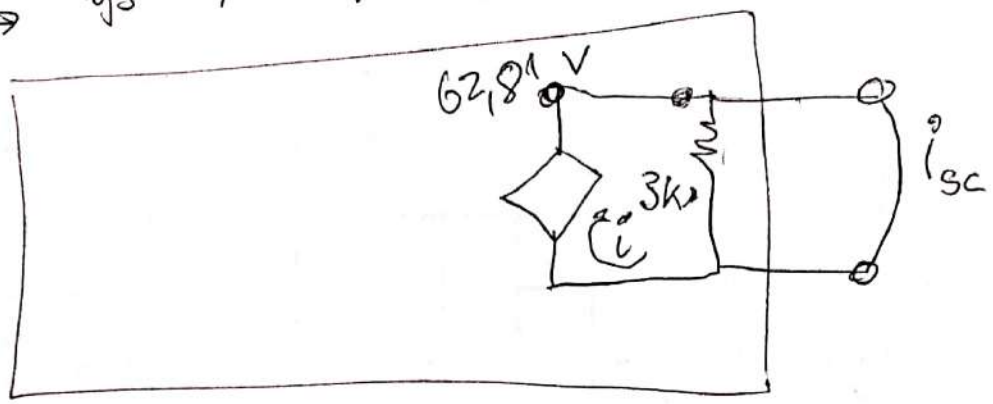
$\boxed{V_{gs} = 62,98 - V_R}$

$V_{gs} = 62,98 - 360 V_{gs}$

$361 V_{gs} = 62,98_V$

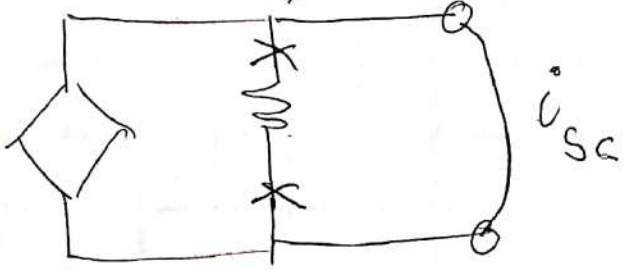
$\boxed{V_{gs} = 0,1745\ V}$

→ $V_{gs} = 0,1745\ V$



$V_R = 360\,(0,1745) = 62,80\ V \leftarrow V_{o.c}$

~~$i = (0,12)\,V_{gs} = 0,021\ A$~~



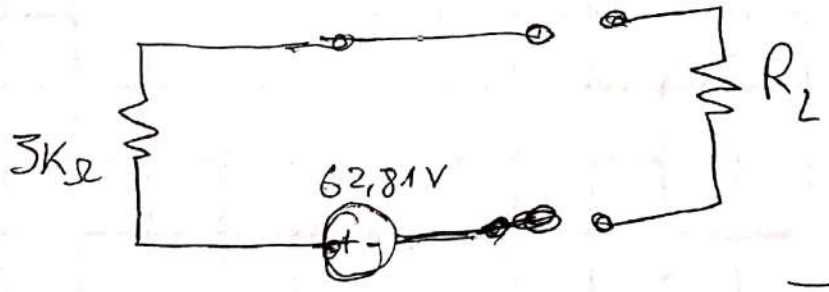
$i_{sc} = 0,12\,V_{sg} = 0,021\ A$

→ $R_T = \dfrac{V_{oc}}{i_{sc}} = \dfrac{62,81\,V}{0,021\,A} = 2999,52\ \Omega \approx 3K\Omega$

→ Teorema Maxima Pot.

↓

R_L debe ser igual a R_T



$P_{MAX} = VI = (62,81)(0,021A)$

$\boxed{R_L = 3K\Omega}$

$\boxed{P_{MAX} = 1,315\ [W]}$

(2).

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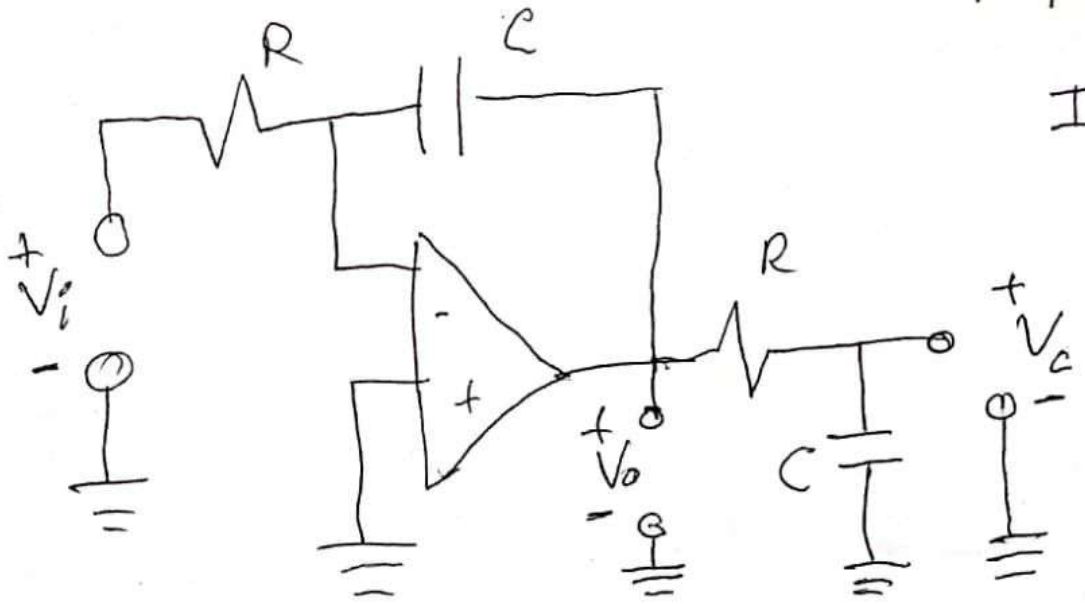
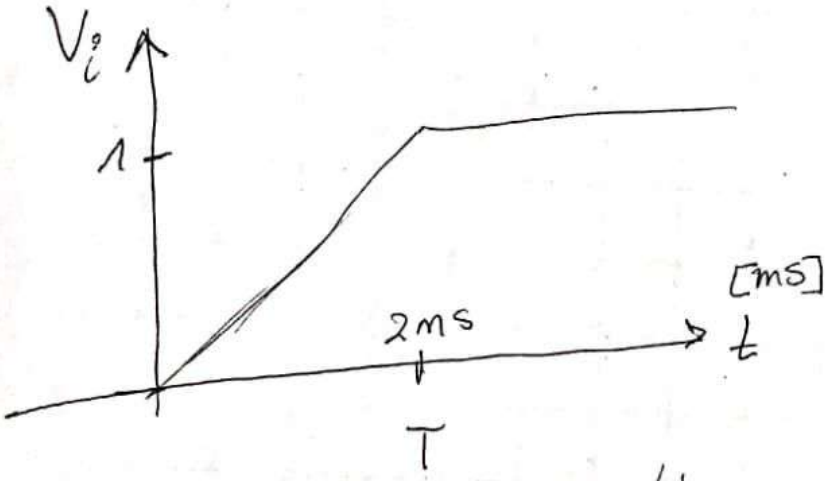




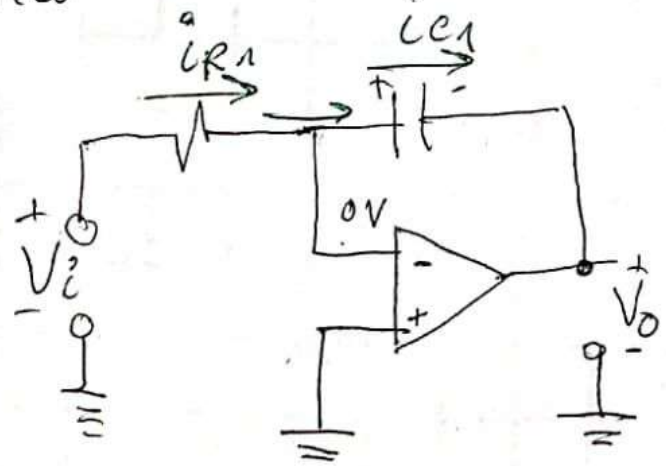
$R = 20K\Omega$

$C = 20\,nF$

$T = \frac{n+1}{2} = \frac{3+1}{2} = 2$ ms

→ condensadores descargados

a. Encuentro la función V_o para $0 < t < 6ms$



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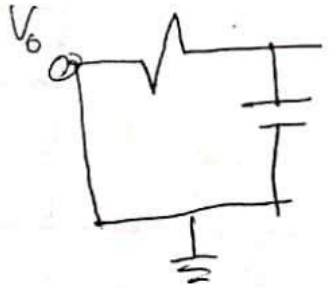


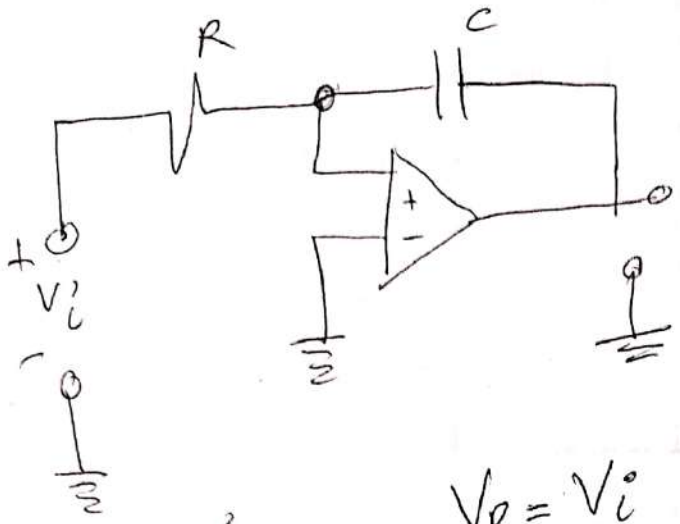
$V_{C_1} = 0 - V_o$

$V_{R_1} = V_i - 0 = V_i$

$i_{R_1} = i_{C_1}$

→ $i_{C_1} = \frac{V_i}{R} = C_1 \frac{dV_{C_1}}{dt}$

$V_{R_1} = i_{C_1} \cdot R$



$V_R = V_i$

$i_R = i_C$

$i_C = C \frac{dV_C}{dt}$

$i_R = \frac{V_i}{R} \rightarrow di_R = \frac{dV_i}{R}$

$di_R = di_C$

$V_C = 0 - V_O$

$V_C = -V_O$

$\frac{V_i}{R} = C \frac{dV_C}{dt}$

$di_C = \frac{dV_i}{R}$

$\frac{1}{R} \frac{dV_i}{dt} = C \frac{dV_C}{dt}$

$\frac{dV_C}{dt} = -\frac{dV_O}{dt}$

$$\boxed{\frac{1}{R} \frac{dV_i}{dt} = C \cdot -\frac{dV_O}{dt}}$$

$$\frac{dV_i}{dt} = \begin{cases} 0 \rightarrow t < 0 \\ \frac{1}{T} \quad 0 < t < T \\ 0 \quad t > T \end{cases}$$

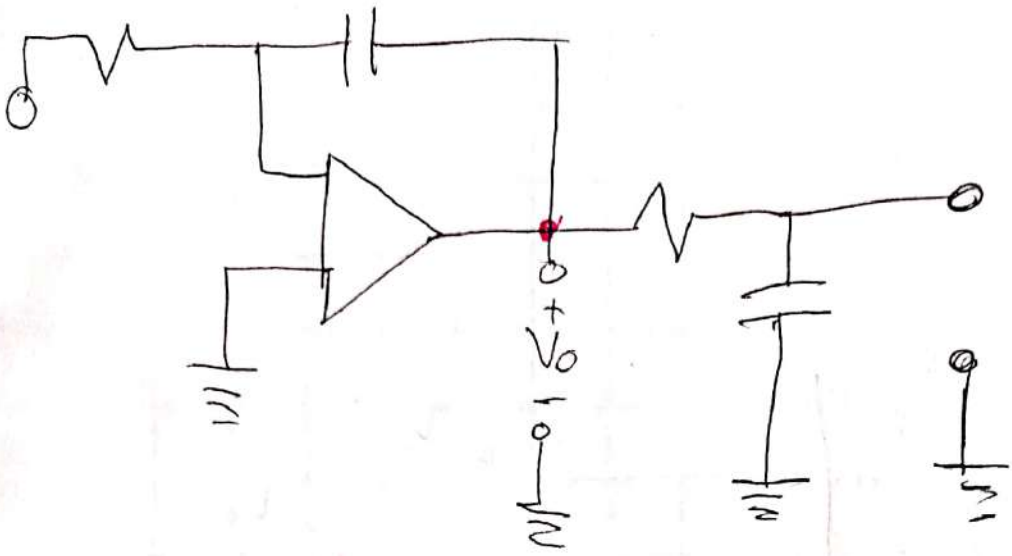
$$\frac{dV_O}{dt} = \frac{-1}{RC} \frac{dV_i}{dt}$$

$$\frac{dV_O}{dt} = \begin{cases} 0 \rightarrow t < 0 \\ \frac{-1}{RCT} \rightarrow 0 < t < T \\ 0 \rightarrow t > T \end{cases}$$

$[0 < t < T]$:

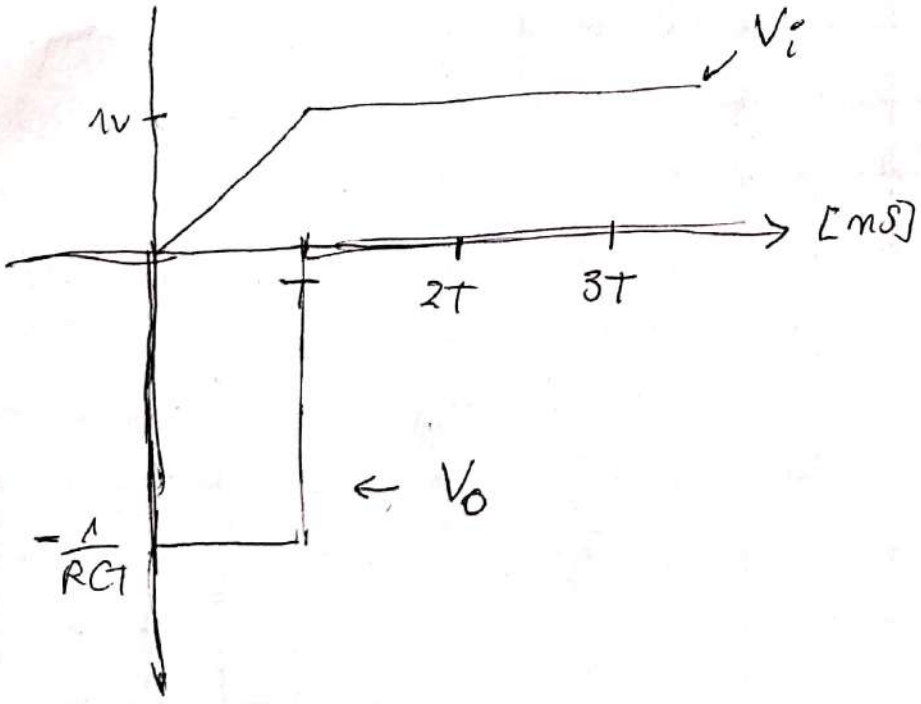
$V_O = \frac{-t}{RCT}$

⟸



$$V_o = \begin{cases} 0 \rightarrow t < 0 \\ \frac{-1}{RCT} \rightarrow 0 < t \leq T \\ 0 \rightarrow t \geq T \end{cases}$$

b) Grafique V_o para $0 < t < 6ms$



$T \rightarrow 2mS = 2 \times 10^{-3}$

$R = 20 \times 10^{3}$

$C = 20 \times 10^{-9}$

$RC = 4 \times 10^{-4}$

$V_o = \frac{-1}{RCT} = \frac{-1}{(4 \times 10^{-4})(2 \times 10^{-3})}$

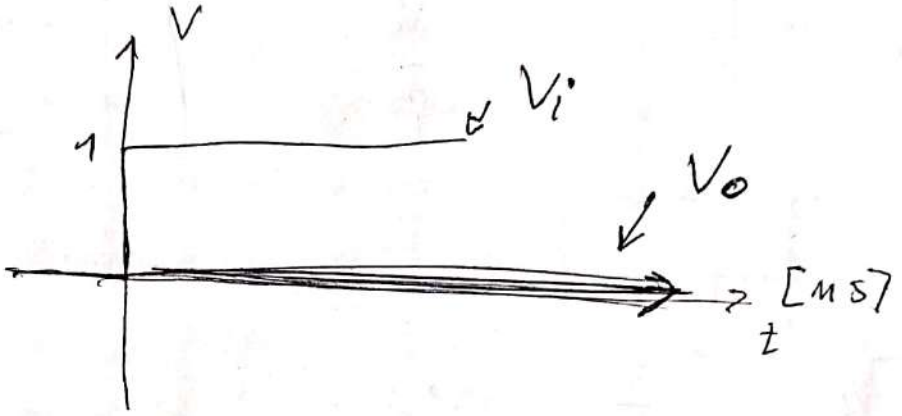
$V_o = -12{,}5 \times 10^{5} V$

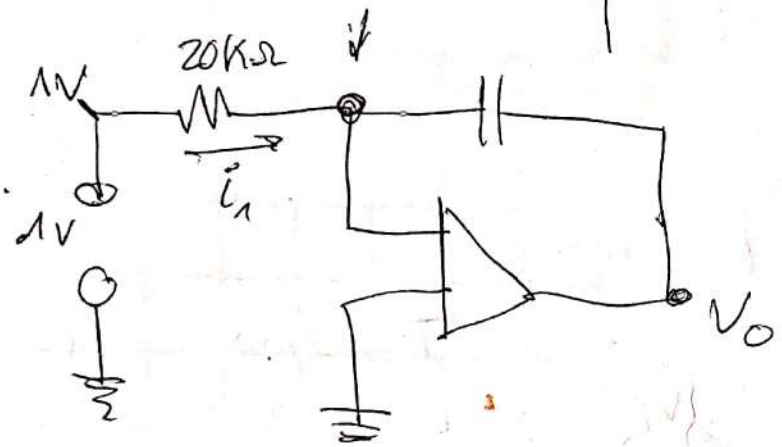
c) Si $V_i(t) = U(t)$

$$V_i(t) = \begin{cases} 0 \rightarrow t<0 \\ 1 \rightarrow t>0 \end{cases}$$

$\frac{dV_i}{dt} = 0\ V$

$\frac{dV_o}{dt} = 0\ V$





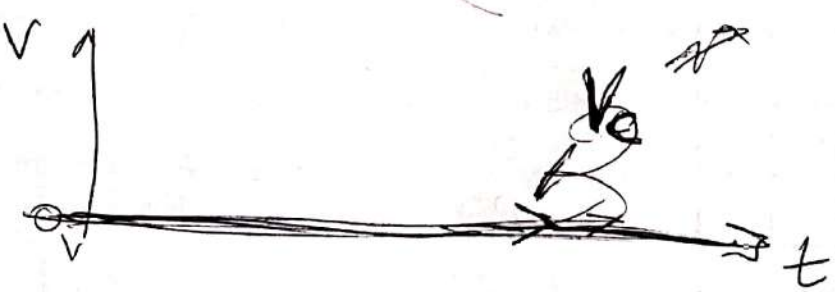
$$V_o(t) = \begin{cases} 0 & t<0 \\ 0 & t>0 \\ 0 & \end{cases}$$

$i_1 = 20\,K\Omega \cdot 1V = 20 \times 10^{-3}\ A$

$V_R = 1$

---

d) (i) $\frac{dV_o}{dt} = 0 \rightarrow \frac{dV_o}{dt} = 0$



ID: .... 3.

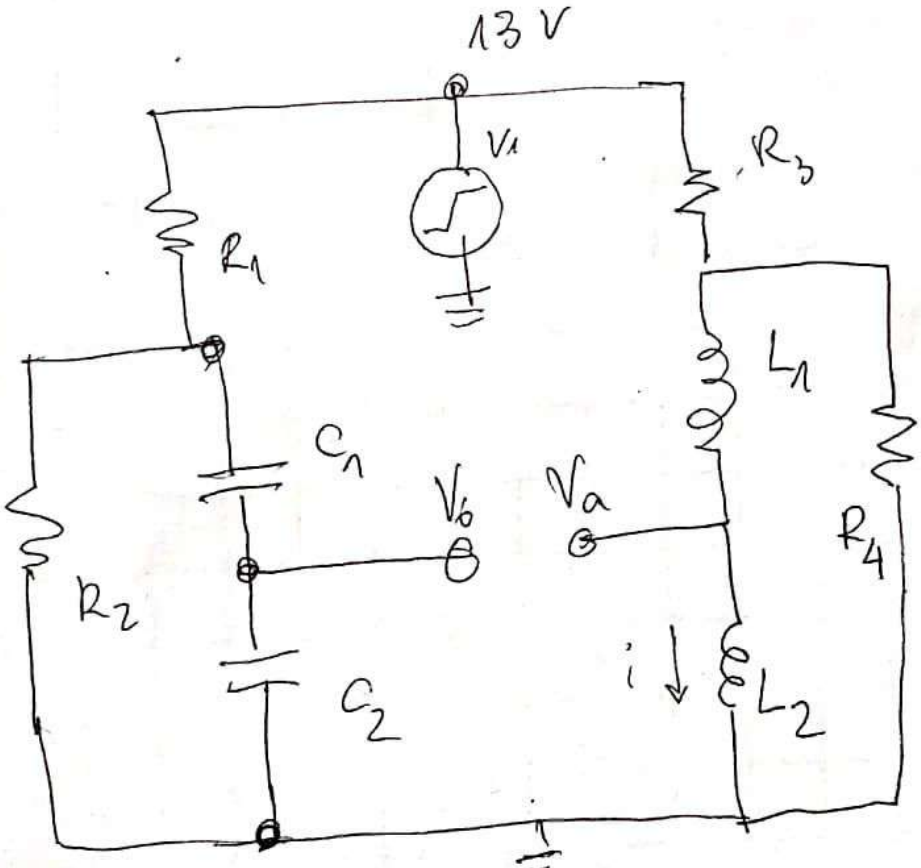
3. $t<0$

$V_{C1} = V_{C2} = 0V$

a. Si $V_1 = V_0 * U(t)$:

$V_a(0^-)$, $V_b(0^-)$, $V_a(0^+)$, $V_b(0^+)$, $i_{L2}(0^-)$, $i_{C2}(0^-)$

$i_{L2}(0^+)$, $i_{C2}(0^+)$



$L_1 = 300\,mH$

$L_2 = 150\,mH$

$C_1 = 16\,\mu F$

$C_2 = 8\,\mu F$

$R_1 = R_2 = 80$

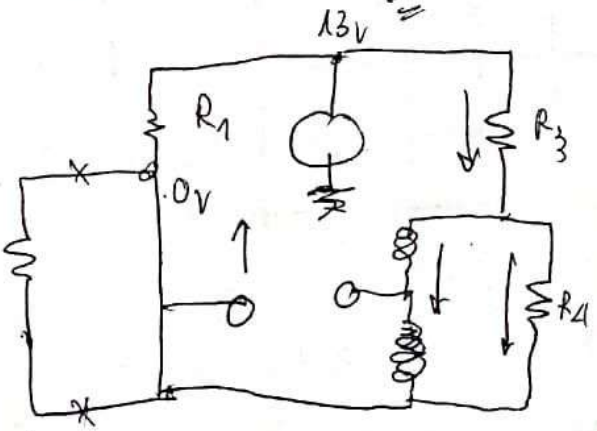
$R_3 = R_4 = 300$

$V_0 = 13\,V$

$\downarrow$

$V_1 < 13\,V \cdot U(t)$

$t<0$

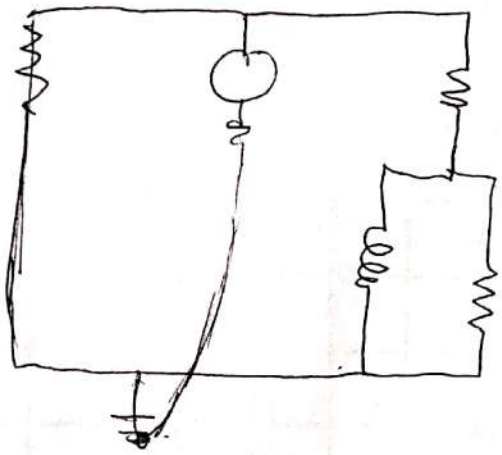


$V_b(0^-) = 0V$

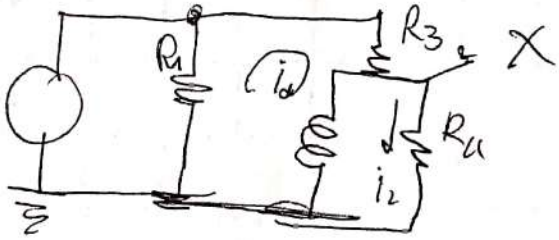
$i_{C_2}(0^-) = 0V$

$V_{L1} + V_{L2} + V_{R4} = 0$

$V_{L1} + V_{L2} + V_{R4} = 0$



$L_1 + L_2 = 450\,mH$



$V_{R1} + V_{R3} + V_L = 0$

$V_{R3} = 13V - X$

$V_{R1} = i \cdot R_1 =$

$V_{R3} = 0{,}1625A \ (300)$

$V_{R3} = 48{,}75\,V$

$i = \frac{13V}{80} = 0{,}1625A$

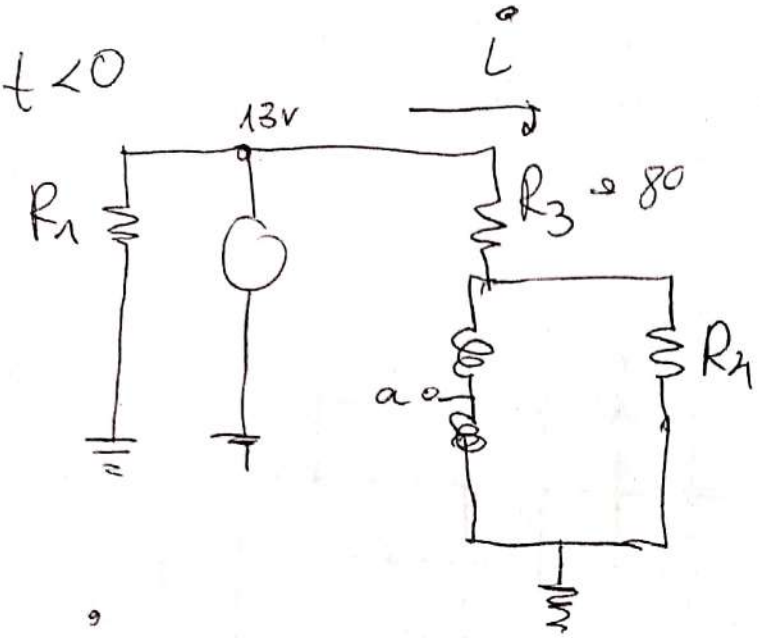
$X = -35{,}7V$

$i = i_1 + i_2$

$0{,}1625\,A = i_L + i_{R4}$

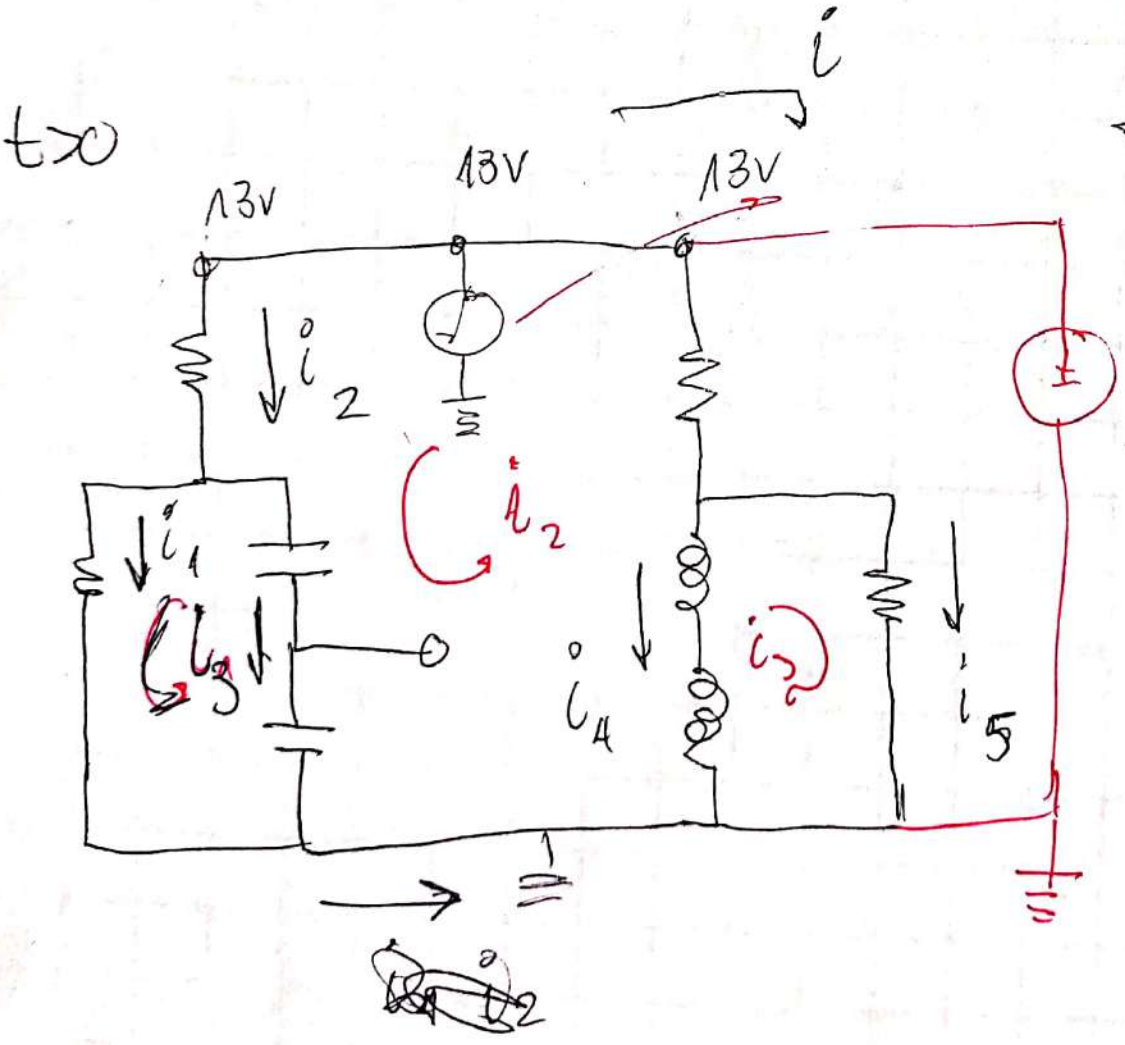
$V_L =$

$t < 0$



$$i = \frac{13V}{80} = 0{,}1625\,A$$

$t > 0$



$$\rightarrow \frac{dv_i}{dt} = de$$

a y d. No hay tiempo... T.T