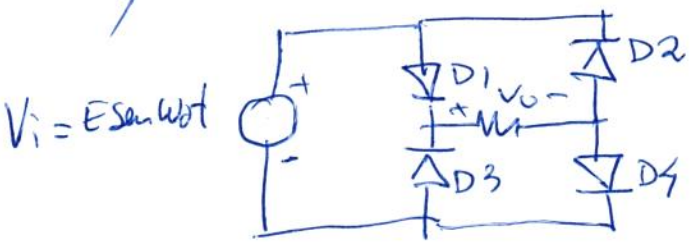
Sistemas Lineales 2

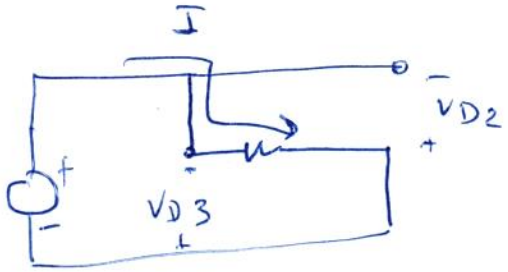
Primer Parcial 2018

Problema 1.

a)



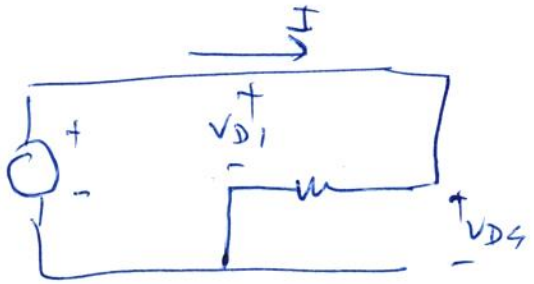
Si $V_i > 0$ D_1 ON, D_4 ON
D_2, D_3 OFF



$I = \frac{V_i}{R} > 0$ $I_{D1} = I_{D4} = I > 0$ ✓

$V_{D3} = V_{D2} < 0$ ✓

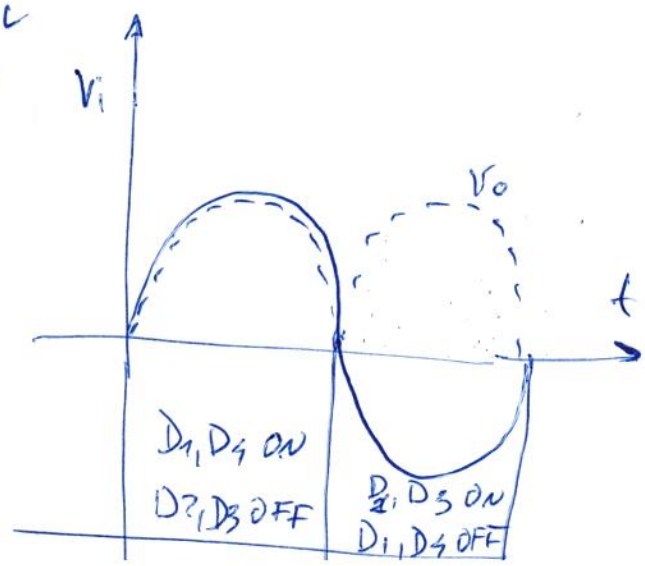
Si $V_i < 0$ D_1, D_3 ON
D_2, D_4 OFF



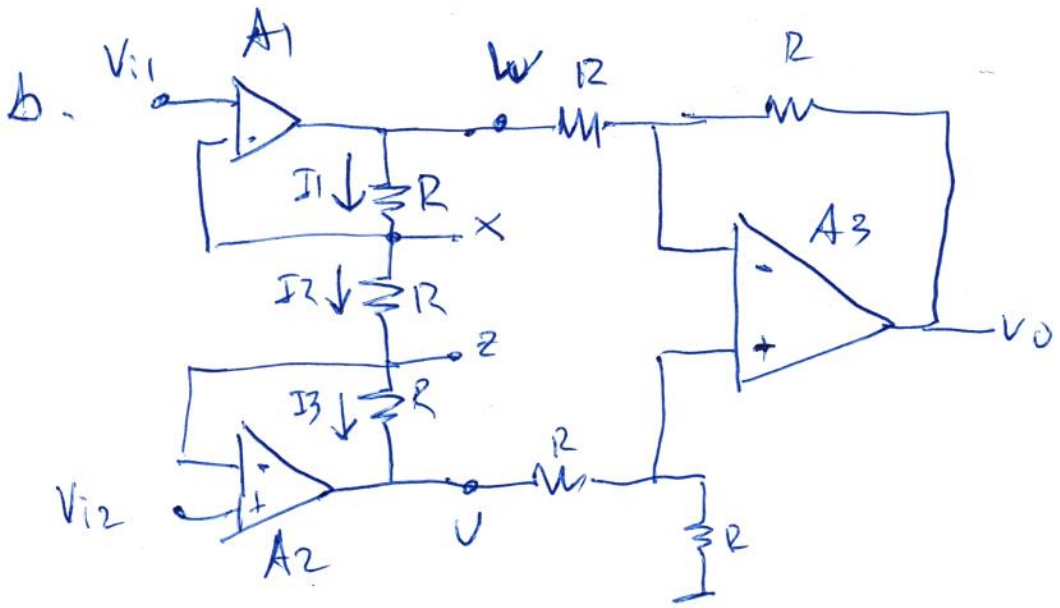
$I = \frac{V_i}{R} < 0$

$I_{D2} = I_{D3} = -I > 0$ ✓

$V_{D1} = V_{D4} = V_i < 0$ ✓



b.



A3 es un amplificador diferencial respecto de W, U:

$V_o = U - W$.

Se cumple $I_1 = I_2 = I_3$

y las tensiones $x = V_{i1}$ por tierra virtual de A_1, A_2

$z = V_{i2}$

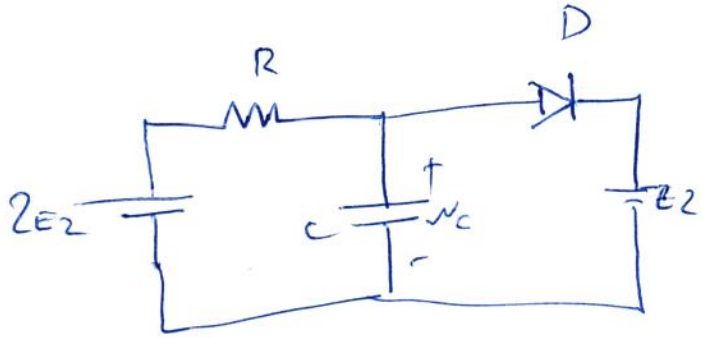
$$\Rightarrow I_2 = \frac{x - z}{R} = \frac{V_{i1} - V_{i2}}{R} \quad y$$

$$W - U = 3R\,I_2 = 3\left[V_{i1} - V_{i2}\right]$$

$$\Rightarrow \boxed{V_o = -3\left[V_{i1} - V_{i2}\right]}$$

Problema 4

Tramo 1

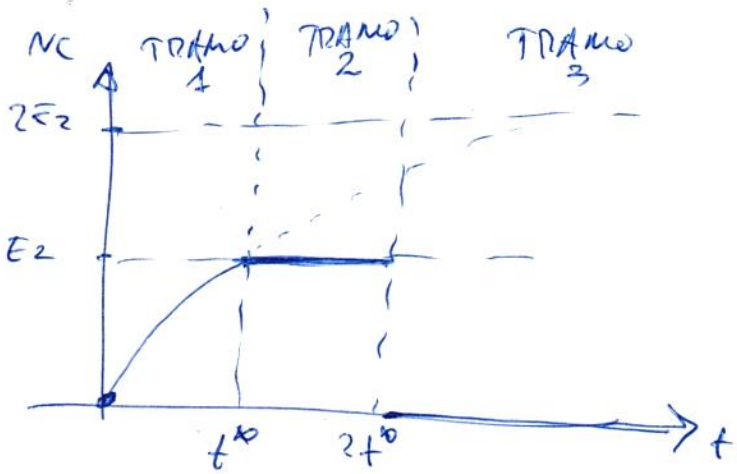


V_c inicialmente $V_c = 0$

D OFF $\quad V_c = 2E_2\left(1 - e^{-t/\tau}\right) \quad \tau = RC$

Se verifica mientras $V_D = V_c - E_2 < 0$

$\Rightarrow V_c < E_2$



t^* es tal que

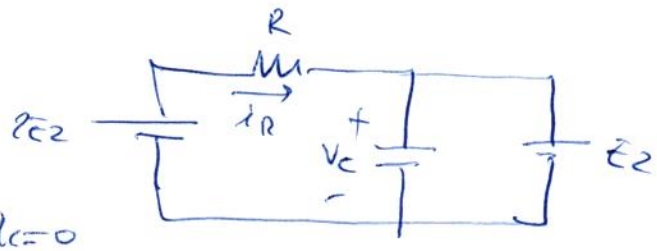
$V_c(t^*) = E_2$

$2E_2\left(1 - e^{-t^*/\tau}\right) = E_2$

$\Rightarrow \boxed{t^* = \tau \ln 2}$

Tramo 2

$t > t^* \quad$ D ON



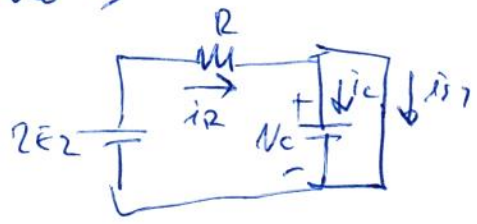
$V_c = E_2$ ctte $\Rightarrow i_C = 0$

$i_R = \frac{E_2}{R}$

$i_D = i_R > 0$ ✓

$t > 2t^{+}$

Trono 3



D OFF

$$\begin{cases} i_R = \dfrac{2E_2}{R} & \forall\, t > 2t^{+} \\ v_c = 0 \end{cases}$$

$$i_c = C\frac{dv_c}{dt} = -CE_2\,\delta(t-2t^{+})$$

$$i_{s_2} = i_R - i_c = \frac{2E_2}{R} + CE_2\,\delta(t-2t^{+})$$