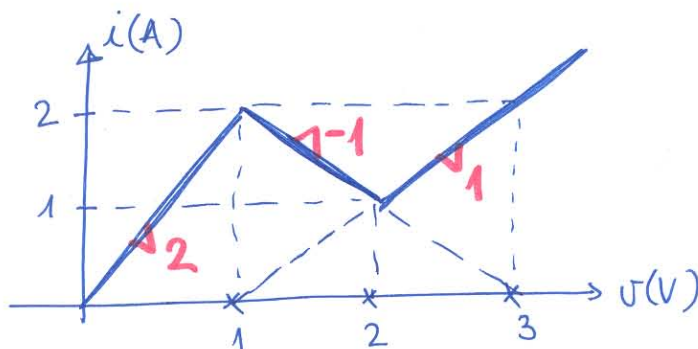
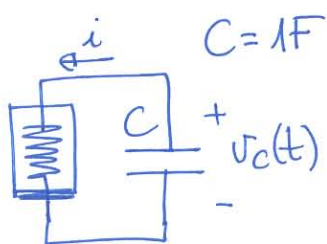


13.- El resistor no lineal de la figura tiene una característica  $i-v$  tal y como se muestra. Si la tensión inicial del condensador es  $3V$ , determine  $v(t)$  y el tiempo  $t^*$  para el cual  $v(t^*) = 1V$ .



$$\begin{aligned} v(t) = 3V, t = 0 &\rightarrow G_T = 1\Omega, R_{eq} = 1\Omega \\ v(t_1) = 2V, t = t_1 &\rightarrow G_T = -1\Omega, R_{eq} = -1\Omega \\ v(t) = 1V, t = t_2 &\rightarrow G_T = 2\Omega, R_{eq} = 1/2\Omega \end{aligned}$$

$0 < t < t_1$   $R_{eq} = 1\Omega, \tau = C \cdot R_{eq} = 1s$   
 $E_T = 1V$ , virtual y estable  

$$v(t) = 1 + (3-1)e^{-t/\tau}$$

$$= 1 + 2e^{-t/1}$$

$$v(t_1) = 2 = 1 + 2e^{-t_1} \Rightarrow t_1 = \ln(2) = 0.69s$$

$t_1 < t < t_2$   $R_{eq} = -1\Omega, \tau = -1s$   

$$v(t) = 3 + (2-3)e^{+(t-t_1)} = 3 - e^{(t-t_1)}$$

$$v(t_2) = 3 - e^{t_2-t_1} = 1$$

$$2 = e^{t_2-t_1} \Rightarrow t_2-t_1 = \ln(2) = 0.69s$$

$$t_2, \forall v(t_2) = 1V \Rightarrow \boxed{t_2 = 2 \times 0.69 = 1.38s}$$