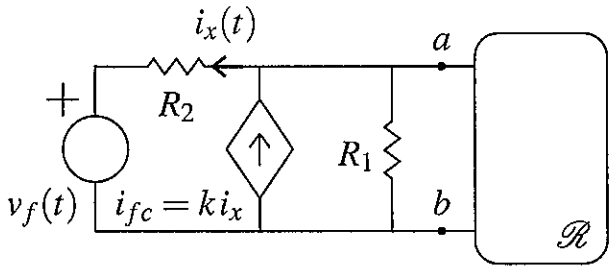
Nombre: Solución

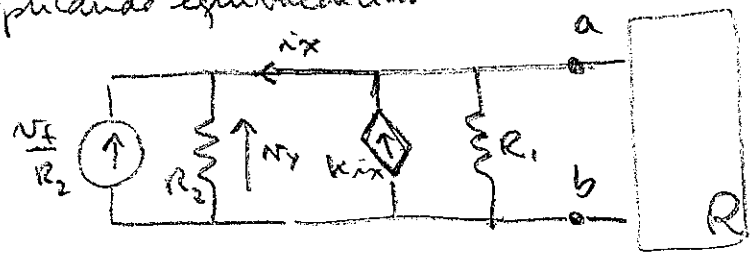
ELO102 – S1 2016 – Control #11 – 13 de junio de 2016

Responda SOLO UNO de los problemas propuestos. Indique cuál responde: 11.1 11.2

Problema 11.1 *En la red de la figura, determine la red equivalente Thévenin desde los terminales $a-b$.*

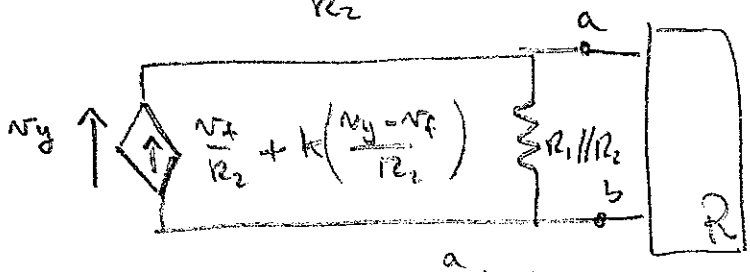


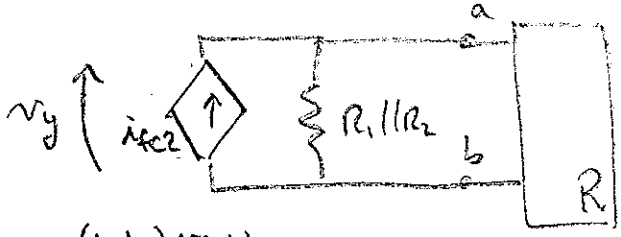
Aplicando equivalencias



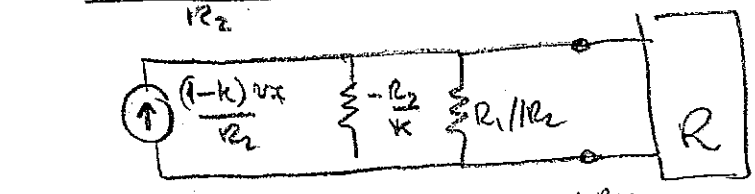
$$i_x + \frac{v_f}{R_2} = \frac{v_y}{R_2}$$

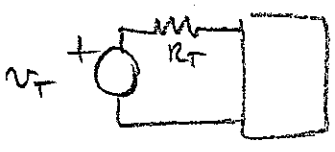
$$i_x = \frac{v_y - v_f}{R_2}$$





$$i_{fc2} = \frac{(1-k)\, v_f + k v_y}{R_2}$$



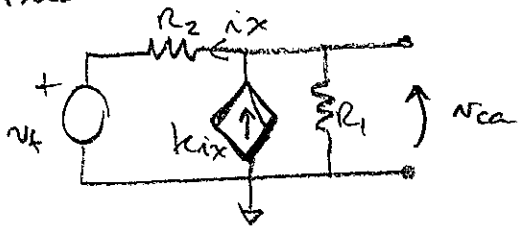


$$R_T = R_1 // R_2 // \left(-\frac{R_2}{k}\right)$$

$$v_T = \frac{(1-k)\, v_f}{R_2} \left(R_1 // R_2 // \left(-\frac{R_2}{k}\right)\right)$$

Método standard

1) Fuente thévenin: v_{ca}

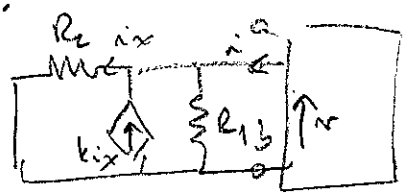


$$i_x - k i_x + \frac{v_{ca}}{R_1} = 0$$

$$i_x = \frac{v_{ca} - v_f}{R_2}$$

$$v_{ca} = \frac{\frac{v_f}{R_2}(1-k)}{\frac{(1-k)}{R_2} + \frac{1}{R_1}}$$

2) R_T:



$$i_x = \frac{v}{R_2}$$

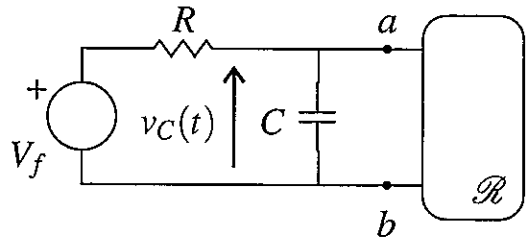
$$i_x - k i_x - i + \frac{v}{R_1} = 0$$

$$(1-k)\frac{v}{R_2} + \frac{v}{R_1} = i$$

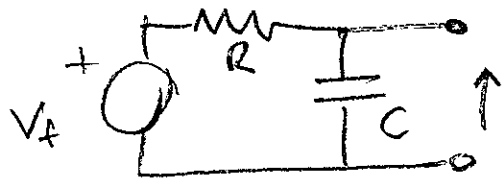
$$\frac{v}{i} = \frac{1}{(1-k)/R_2 + 1/R_1} = \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{-k}{R_2}\right)$$

Solución

Problema 11.2 *Considere la red de la figura, en que $v_C(0) = V_o$ y la fuente de voltaje es constante. Determine el equivalente Thévenin desde los terminales $a - b$.*



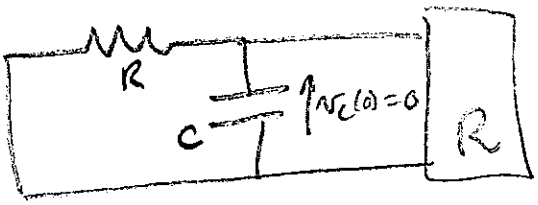
1) voltaje de circuito abierto



$$v_{ca}(t) = v_C(t) = v_C(\infty) + (v_C(0) - v_C(\infty))\, e^{-t/\tau}$$

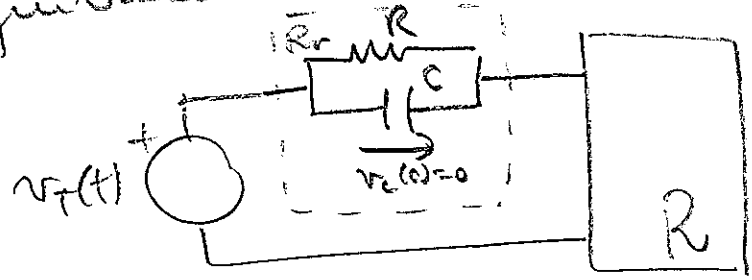
$$v_C(0) = V_o$$
$$v_C(\infty) = V_f$$
$$\tau = RC$$

2) R_T: red relajada más simple



no puede hacerse más simple físicamente

3) Equivalente Thévenin



$$v_T(t) = V_f + (V_o - V_f)\, e^{-t/RC} \qquad \forall t \geq 0$$