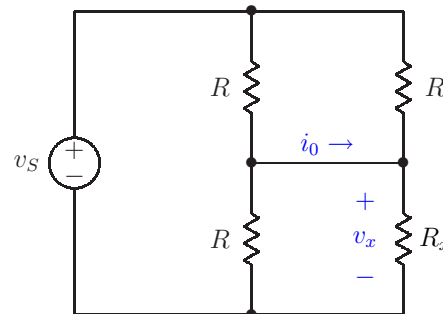
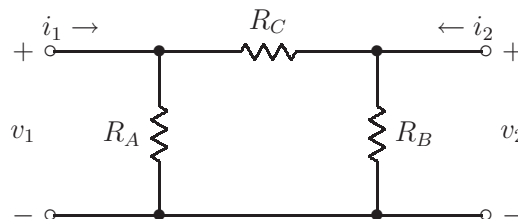


Problem Set 3 (Solutions are due Friday 9-18-09)

- 1) Problem 2-28 in the book.
- 2) Problem 2-50 in the book.
- 3) Problem 2-56 in the book.
- 4) Determine v_x and i_0 in the following circuit in terms of v_S , R , and R_x .



- 5) The circuit shown in the figure below is a π -network with two ports labeled with v_1, i_1 and v_2, i_2 , respectively.



A linear resistive 2-port network can be characterized by two equations as follows

$$\begin{aligned} v_1 &= R_{11} i_1 + R_{12} i_2, \\ v_2 &= R_{21} i_1 + R_{22} i_2. \end{aligned}$$

The coefficients R_{11} , R_{12} , R_{21} , and R_{22} can be found as follows. Set $i_2 = 0$ by leaving port 2 open and connect a current source with value i_1 to port 1 so that

$$\begin{aligned} v_1 &= R_{11} i_1 &\Rightarrow R_{11} &= v_1/i_1, \\ v_2 &= R_{21} i_1 &\Rightarrow R_{21} &= v_2/i_1. \end{aligned}$$

Then set $i_1 = 0$ by leaving port 1 open and connect a current source with value i_2 to port 2 so that

$$\begin{aligned} v_1 &= R_{12} i_2 &\Rightarrow R_{12} &= v_1/i_2, \\ v_2 &= R_{22} i_2 &\Rightarrow R_{22} &= v_2/i_2. \end{aligned}$$

Determine R_{11} , R_{12} , R_{21} , and R_{22} in terms of R_A , R_B , and R_C for the π -network given above.