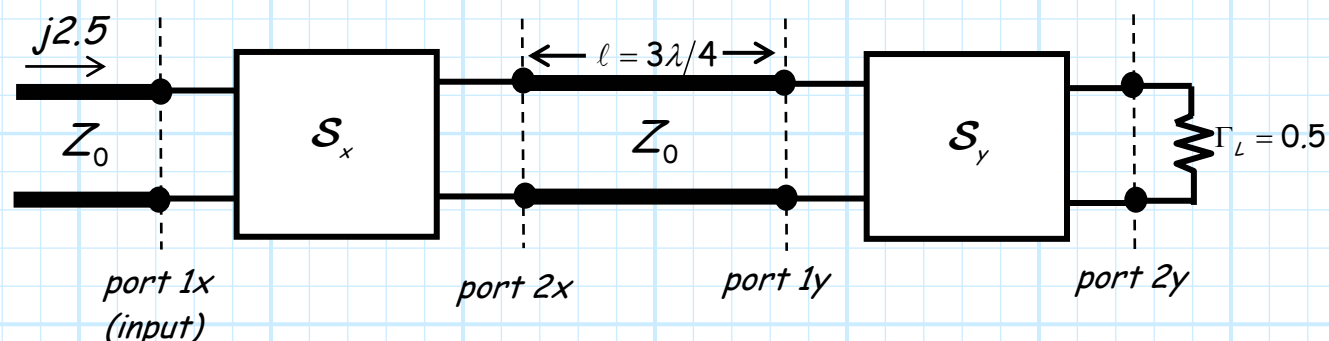


Special Problem 4.5-5

Consider the following circuit:



where $Z_0 = 50\Omega$.

The scattering matrices of the two-port devices are:

$$\mathcal{S}_x = \begin{bmatrix} 0 & 0.5 \\ 0.5 & 0.35 \end{bmatrix} \quad \mathcal{S}_y = \begin{bmatrix} 0.4 & 0.8 \\ 0.8 & 0 \end{bmatrix}$$

Likewise, we know that the value of the voltage wave incident on port 1 of device \mathcal{S}_x is:

$$V_{1x}^+(z_{1x} = z_{1xP}) = j2.5 \text{ V}$$

1. Use the nodes on the next page to draw the **signal flow graph** of this circuit.
2. Reduce this signal flow graph and determine the **total voltage** at port $2x$.

a_{1x}
●

b_{2x}
●

a_{1y}
●

b_{2y}
●

●
 b_{1x}

●
 a_{2x}

●
 b_{1y}

●
 a_{2y}