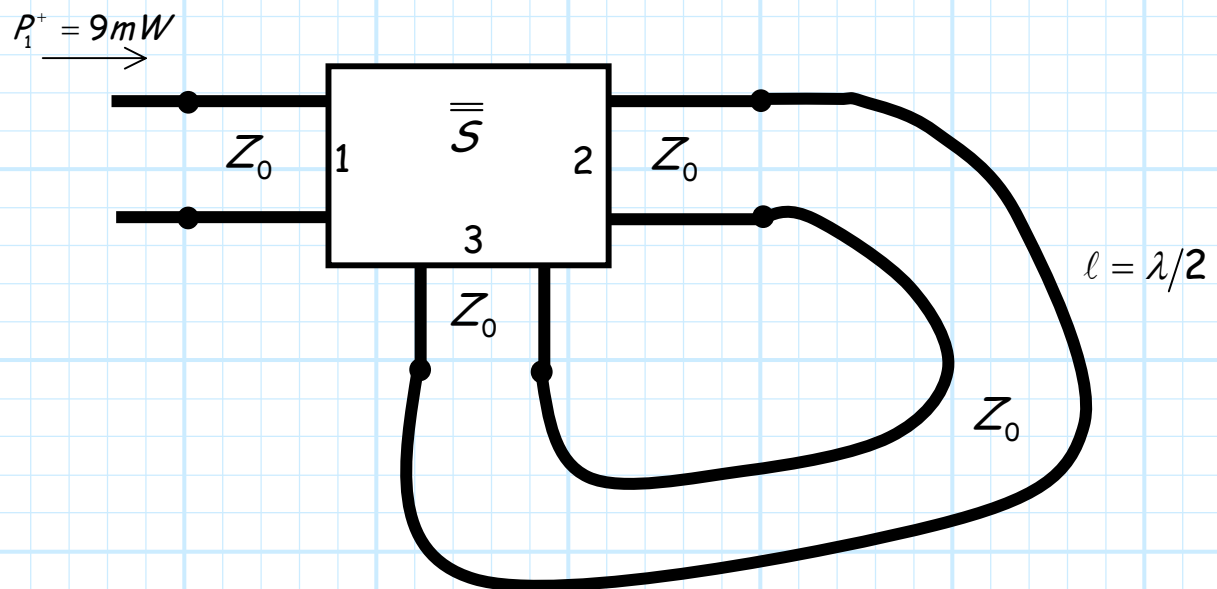


Special Problem 4.5-2

A transmission line of length $\ell = \lambda/2$ is connected between port 2 and port 3 of a **three-port network**.

The power incident on port 1 is $P_1^+ = 9\text{mW}$.



The network has a scattering matrix:

$$\mathbf{S} = \begin{bmatrix} 0 & \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & 0 & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} & 0 \end{bmatrix}$$

Use **signal flow graph techniques** (you must use a signal flow graph!) to help you determine the power **exiting port 1** (i.e., P_1^-).

Start by drawing the signal flow graph with the nodes shown on the **next page**.

Carefully note the arrangement of these nodes (trust me, they make sense)!

b_2
●

a_1
●

b_3
●

●
 a_3

●
 b_1

●
 a_2