

**Special Problem 2.E-5**

Consider a **reciprocal** device with the following scattering matrix:

$$\mathbf{S} = \begin{bmatrix} 0 & 0.5 & S_{13} \\ 0.5 & 0 & 0.6 \\ 0.4 & 0.6 & 0.2 \end{bmatrix}$$

- a) Is this **device** matched ?
- b) Determine  $S_{13}$  .
- c) Say 10 mW is incident on port 1, and all other ports are terminated in matched loads. How much power will flow **out of** (i.e., exit from) port 2? port 3?
- d) Is this device **lossless**?
- e) What is the **return loss** at port 3 if all other ports are terminated in matched loads?