

**Special Problem 3.G-1**

Consider a **directional coupler** with the following scattering matrix:

$$\mathcal{S} = \begin{bmatrix} 0.01 & 0.98 & j0.1 & 0.01 \\ 0.98 & 0.01 & 0.01 & j0.1 \\ j0.1 & 0.01 & 0.01 & 0.98 \\ 0.01 & j0.1 & 0.98 & 0.01 \end{bmatrix}$$

Assuming that all ports are terminated in matched loads, determine in **dB**:

- a) the **return loss** of the input ports.
- b) the **coupling** of the device.
- c) the **directivity** of the device.
- d) the **isolation** of the device.
- e) the **coupling loss** of the device.
- f) the **mainline loss** of the device.
- g) the **insertion loss** of the device.