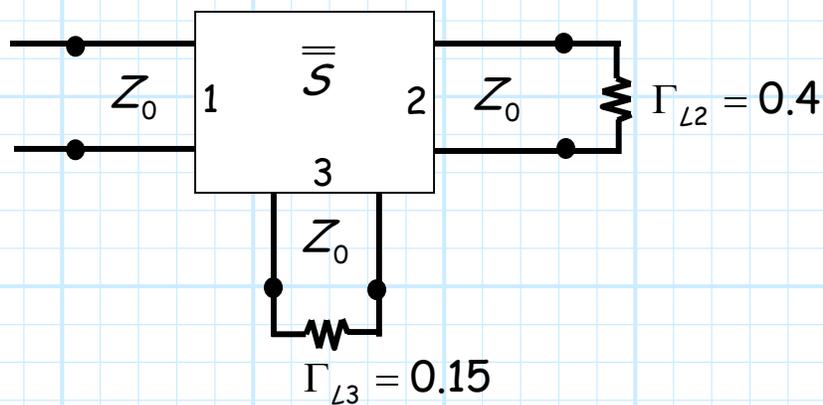**Special Problem 4.5-3**

Two **loads** are connected to a non-reciprocal, **three-port** device.

The three-port device has the **scattering matrix**:

$$\overline{\overline{S}} = \begin{bmatrix} 0 & 0.5 & 0.3 \\ 0.2 & 0 & 0 \\ 0 & 0.1 & 0 \end{bmatrix}$$

Using the **nodes provide on the next page**, carefully and completely **draw** this signal flow graph of this network, including the **value** and **direction** of each and every (non-zero) **branch**.

Determine the **total voltage** at port 3, if $a_1 = j2$ and $Z_0 = 50\Omega$.

a_1

b_2

b_1

a_2

a_3

b_3