

### Special Problem 7.2 -1

Consider the **3-port coupler** below.

Note it is similar to a lossless coupler, with the exception that there is a **shunt resistor** of  $R = 2Z_0$ .

There are two quarter-wavelength transformers in the circuit, each with the **same** characteristic impedance  $Z_1$ .

1. Determine the characteristic impedance  $Z_1$  of the quarter-wavelength sections required to make  $S_{11} = 0$  (i.e., make port 1 matched).
2. Determine the fraction of the power incident on port 1 that exits port 2 (assuming ports 2 and 3 are terminated in matched loads).

