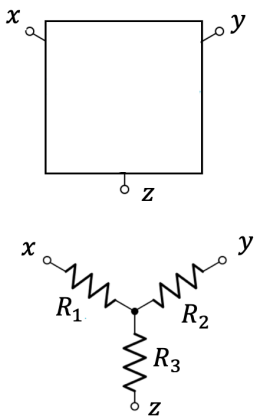
Prelab 3 – A Wye of Resistors

Note: You work alone on both this prelab and the in-lab portion of Lab 3. Answers to the questions below should be entered online at the link provided on the ELE 215 website.

For both this prelab and its corresponding lab, you will be considering the electrical characteristics of a 3-terminal device as suggested by the simple box-like image to the right. Specifically, this is a device with exactly three distinguishable connection points, labeled x, y, and z. Further, we will imagine that the only devices inside the device are resistive in nature. With this restriction one obvious way to "model" the internals of the device is as a "Y" (or "T") configuration of resistors (we will consider the Delta (pi) configuration in the lab itself). Specifically, the second figure to the right shows three internal resistances labeled R_1, R_2, and R_3 connected to x, y, and z, respectively.



Your goal for this prelab will be to compute the values of the resistors from some DMM measurements. Specifically, your online problem access will provide 6 measurements (each to 3 sig figs) about the circuit above:

- U_{x-y} is the resistance measured between terminals x and y with terminal z unconnected. As configured, this value depends upon R_1 and R_2, but not R_3.
- U_{x-z} and U_{y-z} are similar.
- S_{xy-z} is the resistance measured between terminals x and z with terminal y shorted to terminal x. With the two terminals shorted together, the measurement depends upon all three resistors.
- S_{xz-y} and S_{yz-x} are similar.

Note – you should assume that the resistors are standard values between 1 k and 100 k ohms.:

1000 Ω	1200 Ω	1500 Ω	1800 Ω	2200 Ω	2700 Ω
3300 Ω	3900 Ω	4700 Ω	5600 Ω	6800 Ω	8200 Ω
10 kΩ	12 kΩ	15 kΩ	18 kΩ	22 kΩ	27 kΩ
33 kΩ	39 kΩ	47 kΩ	56 kΩ	68 kΩ	82 kΩ
100 kΩ					

without replacement (i.e. at most one of each value).

Procedure:

1. Using whatever methods work for you, find the three resistances.

2. Enter your answers via the link to the online grading tool on the ELE 215 website; use the nominal values as listed above.