7.2 Analysis technique

The goal of series-parallel resistor circuit analysis is to be able to determine all voltage drops, currents, and power dissipations in a circuit. The general strategy to accomplish this goal is as follows:

• Step 1: Assess which resistors in a circuit are connected together in simple series or simple parallel.

• Step 2: Re-draw the circuit, replacing each of those series or parallel resistor combinations identified in step 1 with a single, equivalent-value resistor. If using a table to manage variables, make a new table column for each resistance equivalent.

• Step 3: Repeat steps 1 and 2 until the entire circuit is reduced to one equivalent resistor.

• Step 4: Calculate total current from total voltage and total resistance (I=E/R).

• Step 5: Taking total voltage and total current values, go back to last step in the circuit reduction process and insert those values where applicable.

• Step 6: From known resistances and total voltage / total current values from step 5, use Ohm's Law to calculate unknown values (voltage or current) (E=IR or I=E/R).

• Step 7: Repeat steps 5 and 6 until all values for voltage and current are known in the original circuit configuration. Essentially, you will proceed step-by-step from the simplified version of the circuit back into its original, complex form, plugging in values of voltage and current where appropriate until all values of voltage and current are known.

• Step 8: Calculate power dissipations from known voltage, current, and/or resistance values.