



We consider an electric circuit which contains a power supply of 9 volts and is made of 5 resistors. In order to determine the voltage at each point, we need to know 2 laws:

- **Ohms law** $U = RI$ relates the resistance R , the current I and the voltage difference U near a resistor.
- **Kirchhoffs law:** tells that the sum of the currents passing to a point is zero.

In our circuit all resistors have resistance 1. Consequently, by Ohm's law the current through a resistor is the voltage difference. From Kirchhoff's law we get the equations:

$$\begin{cases} x - 0 + x - y + x - z = 0 \\ y - x + y - z = 0 \\ z - x + z - 9 + z - y = 0 \end{cases}$$

The voltages x, y, z at the corresponding points of the circuit satisfy the linear equations:

$$\begin{cases} 3x - y - z = 0 \\ -x + 2y - z = 0 \\ -x - y + 3z = 9 \end{cases}$$

Can you solve these equations?