

## Kirchoff's Rules

### 1. Loop Rule

$$\left( \sum_{i=1}^N V_i \right)_{\text{loop}} = 0$$

Conservation of energy

- Downstream subtract  $V$
- Upstream add  $V$

### 2. Point Rule

$$\sum_{i=1}^N I_{\text{in}} = \sum_{i=1}^N I_{\text{out}}$$

Conservation of charge

$$I_1 + I_2 = I_{\text{tot}}$$