Lecture 3, Jan 19, 2022
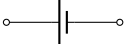
Power Conservation

- For any circuit, $\sum P_k = 0$ (power conservation law)
  - Note the signs are very important here

Circuit Elements – Independent Sources

1. Independent voltage sources: voltage sources that provide a fixed voltage no matter what current is flowing through it
   - The voltage could be fixed or a time-variant function, e.g. $v_s(t) = 5\cos(100t + 2)\mathrm{V}$
   - Generic notation:

   - Fixed voltages:

   - Sinusoidal voltage source:

   - These are just *models*; they don't actually exist because in reality current always impact the voltage a little bit
   - Which way the current flows depends on the circuit, so whether the voltage source produces or consumes power depends on the circuits
2. Independent current sources: current sources that provide a fixed current no matter the voltage across it
   - Current could be fixed or time-variant
   - Generic notation:

   - Polarity depends on the rest of the circuit and so does whether it generates or consumes power