Superposition and Introduction to Thévenin Equivalent Circuits
Superposition

More than one source in the circuit must be independent source

equivalent to
\[ V_{Sn} = 7V + 3V = 10V \]
\[ I_{Sn} = 1.4A + 0.6A = 2A \]
\[ V_{10k} = 2mA \times 10k\Omega + 13mA \times 10k\Omega \]
\[ I_{10k} = 2mA + 13mA \]
not allowed
violates KCL

not allowed
violates KVL
Thevenin Equivalent Circuits

\[ V_{th} \]
\[ R_{th} \]
\[ V_L \]
\[ R_L \]
Determine $V_{oc}$ open circuit voltage

$I_{sc}$ short circuit current

Calculate $R_{th} = \frac{V_{oc}}{I_{sc}}$

Let $V_{oc} = V_{th}$

$V_{oc} = V_{2}$
The direction of the current is set by the + side of Voc.

\[ I_{sc} = \frac{V_2}{R_6} \]

\[ R_{th} = \frac{V_{oc}}{I_{sc}} = R_6 \]
An alternate way to determine $R_{th}$:
- Short all voltage sources in circuit
- Open all current sources in circuit

Then calculate $R_{eq}$ w/o $R_L$

\[
R_{eq} = R_{th}
\]