Thevenin / Norton Equivalent Circuits and Source Transformation

1. Thevenin equivalent circuits

2. There are three methods to find $V_{th}$ and $R_{th}$.
   a) Find $V_{oc}$ (open circuit voltage) and $i_{sc}$ (short circuit current).

   Then, $V_{th} = V_{oc}$ and $R_{th} = \frac{V_{oc}}{i_{sc}}$

3. Find either $V_{oc}$ and $i_{sc}$ as above (whichever is easier).
   Then, deactivate all independent sources (i.e. set them to 0). Then, simplify circuit to find the equivalent resistance. This is $R_{th}$. (This method only works if there are no dependent sources in circuit.)

4. (add $V_{ex}$)
Add a fictitious $V_{ex}$ as above.
Solve for $i_{ex}$.
\[ R_{th} = \frac{V_{ex}}{i_{ex}} \]

II. Source transformations

If a circuit can be represented by a voltage source and a resistor, it stands to reason that it should also be similarly represented by a current source and a resistor.

\[ I_n = I_{th} \]

\[ I_n = \frac{V_{th}}{R_{th}} \]