Lecture 9:
1) Source Transformations
2) Thevenin & Norton Sources

Chapter 4
Techniques of Circuit Analysis: Sections 4.9, 4.10
Source Transformations
Simplify the Circuit by Source Transformation

(a)

(b)
Example 4.8: Find $P_{6\,V}$
AP 4.15: Find $v$
Equivalent Voltage and current

\[ V_{ab} ? \]

\[ I_{ab} (=I_R)? \]
Thevenin Equivalent
Thevenin Equivalent Circuit

A resistive network containing independent and dependent sources

\[ V_{\text{Th}} \]

\[ R_{\text{Th}} \]
Thevenin Equivalent Circuit: Why do we care?

Output Port

\[ I_o = I_c \frac{(1 + 2/\beta)\beta}{\beta + 1} \]

\[ R_{TH} \]

\[ -V_{EE} \]

\[ I_c \]

\[ Q_1 \]

\[ Q_2 \]

\[ Q_3 \]
Find Thevenin Equivalent
Sadiku Practice Problem 4.8 (p.142) : Thevenin Equi.
Norton Equivalent Circuit

A resistive network containing independent and dependent sources
Find Norton Equivalent
AP 4.17: Find Norton Equivalent

\[\begin{align*}
&15 \text{ A} \\
&\quad \bigg| \\
&8 \Omega \quad 10 \Omega \\
&\quad \bigg| \\
&2 \Omega \\
&\big| \\
&a \quad b
\end{align*}\]
AP 4.18: Find Both Thevenin and Norton Equivalents

The diagram shows a circuit with a voltage source of 36 V, a current source of 18 mA, two resistors of 12 kΩ and 15 kΩ, and a load resistor of 60 kΩ between points A and B. The voltage across points A and B is denoted as $v_{AB}$. To find the Thevenin and Norton equivalents, you need to analyze the circuit under these conditions.