Exam #2 → Thursday, February 21

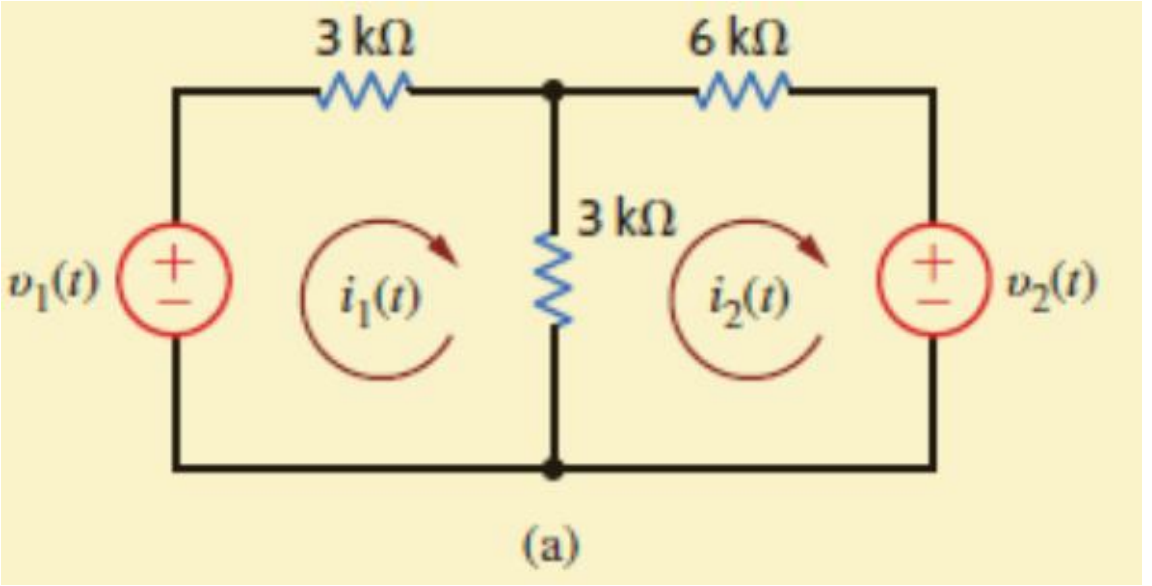
Concepts Chapter #3:

1) Nodal Analysis
   - Select node as reference
   - # of Eq. = # of nodes – 1
   - variables → voltages
   - KCL → equations
   - voltage source → constraint eq. (express in terms of variables)
   - voltage source between 2 non-reference nodes → supernode
2) Loop Analysis
   - # of Eq. = # of independent loops
   - variables → currents (assign a loop current to each independent loop)
   - KVL → equations
   - current source → constraint eq. (express in terms of variables)

*** "Bate": bring your own set of equations (no problems, photocopies, solutions, etc)… subject to approval by the professor

Last Lecture → Superposition

In any linear circuit containing multiple independent sources, the current or voltage at any point in the network may be calculated as the algebraic sum of the individual contributions of each source acting alone.



Analysis:

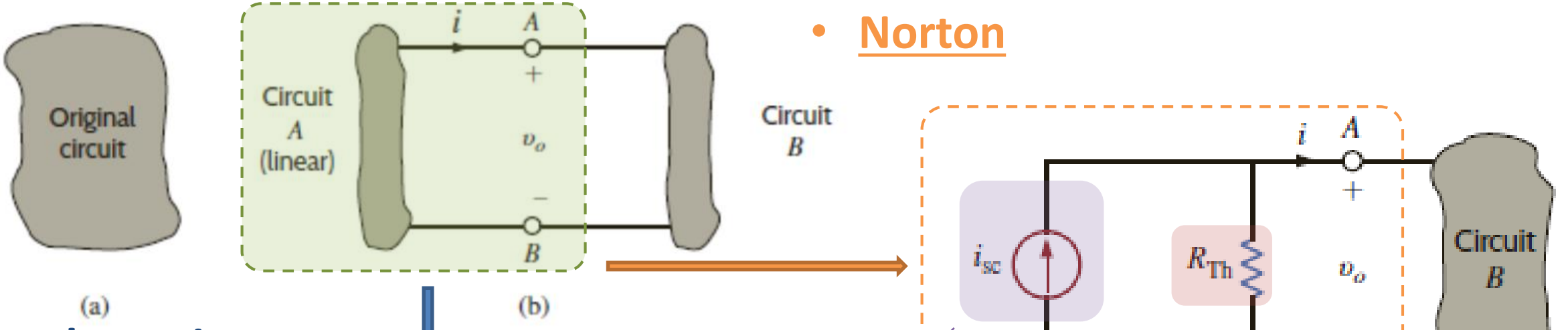
$$i_1(t) = i_1'(t) + i_1''(t)$$

Each independent source can be applied independently with the remaining source turned off:

- ***Turn off a voltage source*** → *short circuit*
- ***Turn off a current source*** → *open circuit*

The final solution is the algebraic sum of the independent results!.

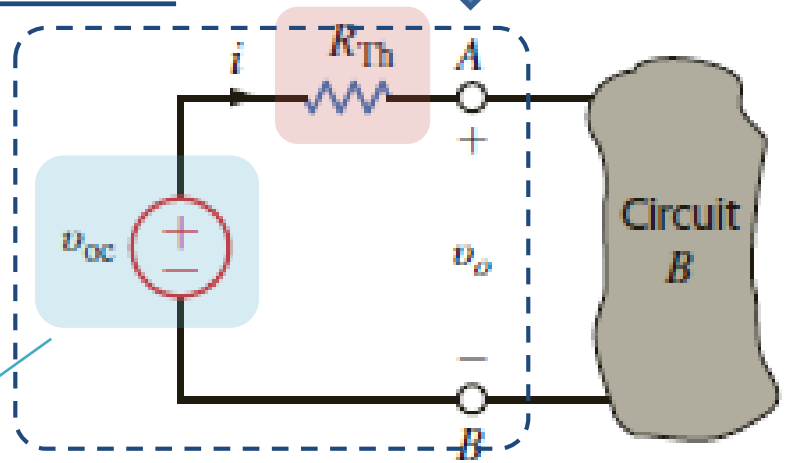
Thevenin's and Norton's Theorems



- **Norton**

i_{sc}: short circuit current from circuit A measured at A-B

- **Thevenin**



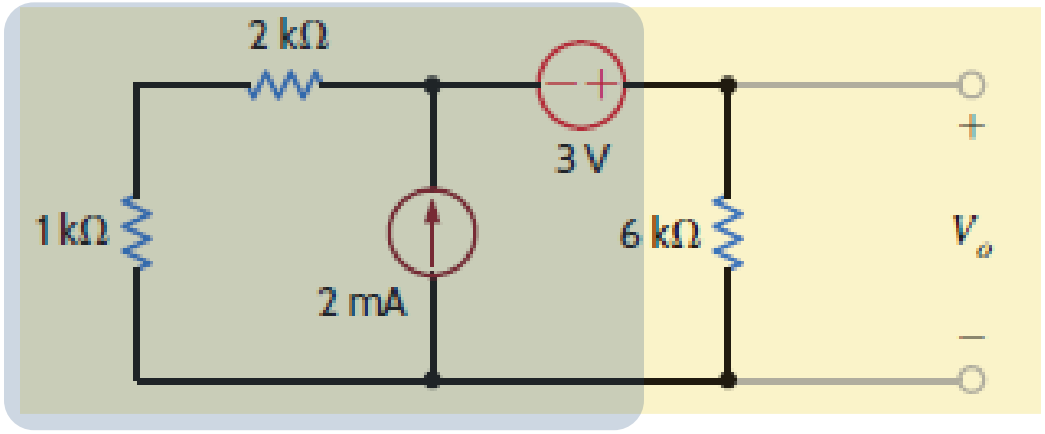
v_{oc}: open circuit voltage from circuit A measured at A-B

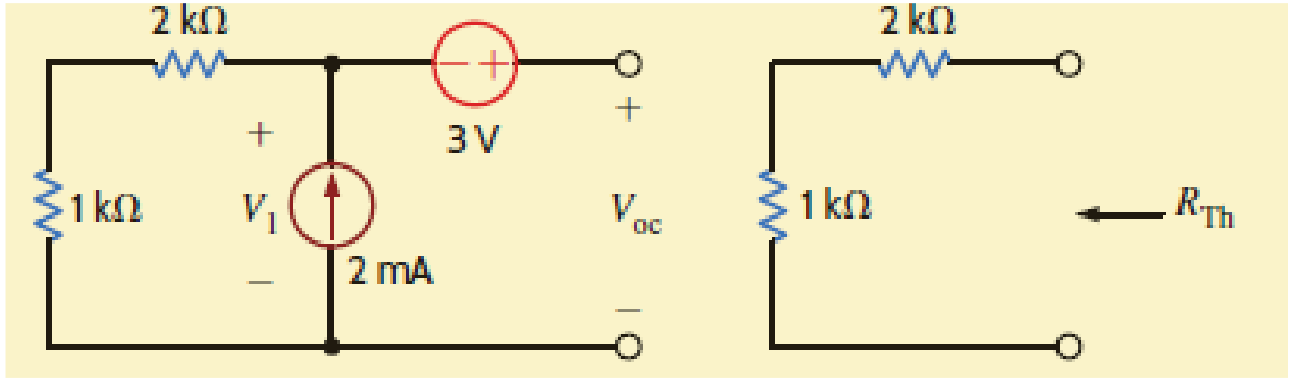
R_{Th}: equivalent resistance looking back into circuit A from A-B with all independent sources in circuit A made zero

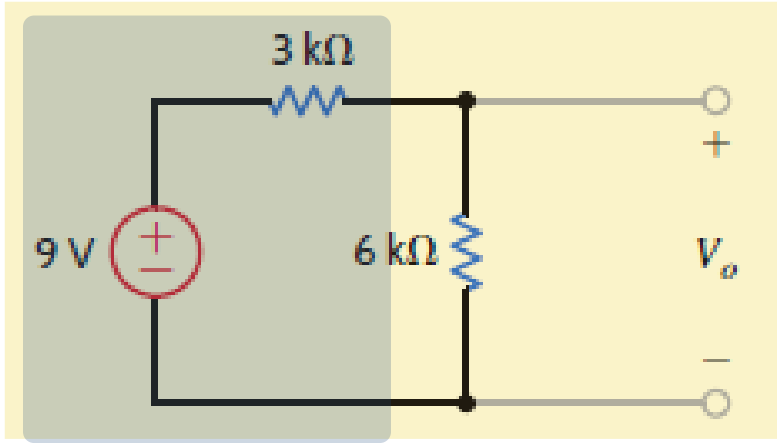
$$v_{oc} = R_{Th} \cdot i_{sc}$$

Thevenin's Theorem → Independent Sources Only

Example 5.5: Use Thevenin's and Norton's theorems to find V_0 in the network provided.







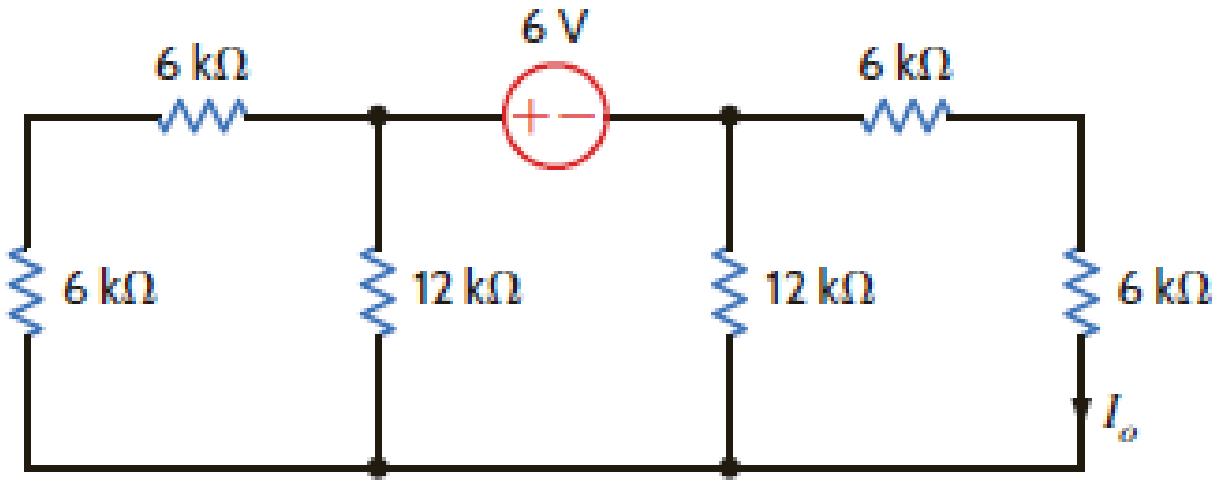
$$V_{OC} = 2m(1k + 2k) + 3 = 9V$$

$$R_{th} = 1k + 2k = 3k\Omega$$

$$V_O = 9\frac{6k}{3k + 6k} = 6V$$

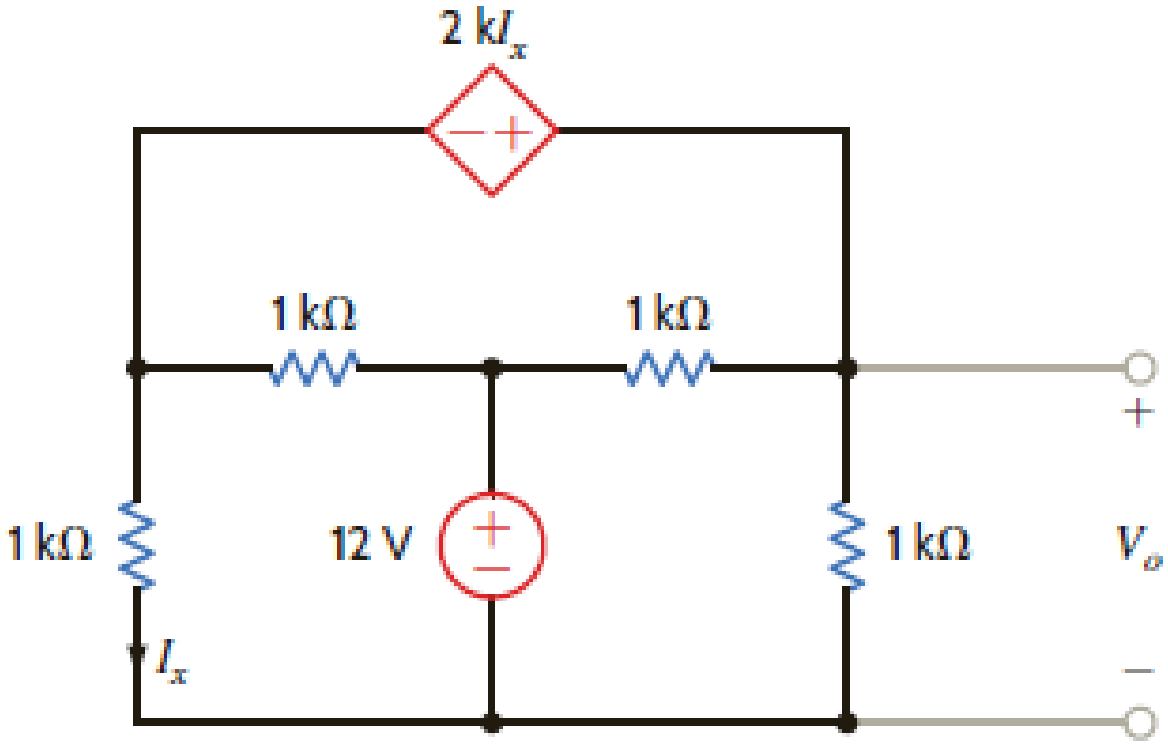
Problem → 3.31

Find I_0 using both nodal and mesh analysis



Problem → 3.310

Find V_0 using both nodal and mesh analysis



Problem → 3.124

Find I_0 using both nodal and mesh analysis