Exam #3 → ~~Tuesday, March 5~~

→ Thursday, March 7

→ Tuesday, March 12

Concepts Chapter #5:

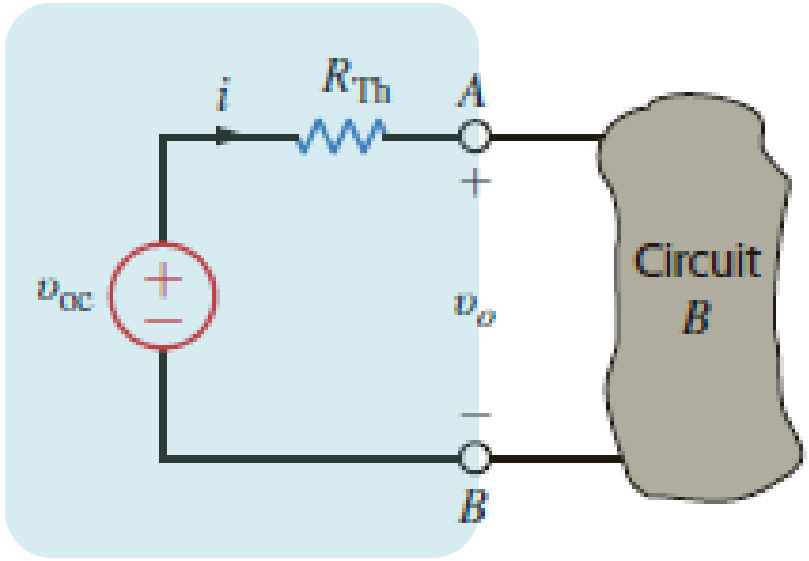
1) Superposition
2) The venin's & Norton's Theorem
3) Source Transformation
4) Maximum Power Transfer

Last Lecture → Thevenin & Norton Equivalent Circuit

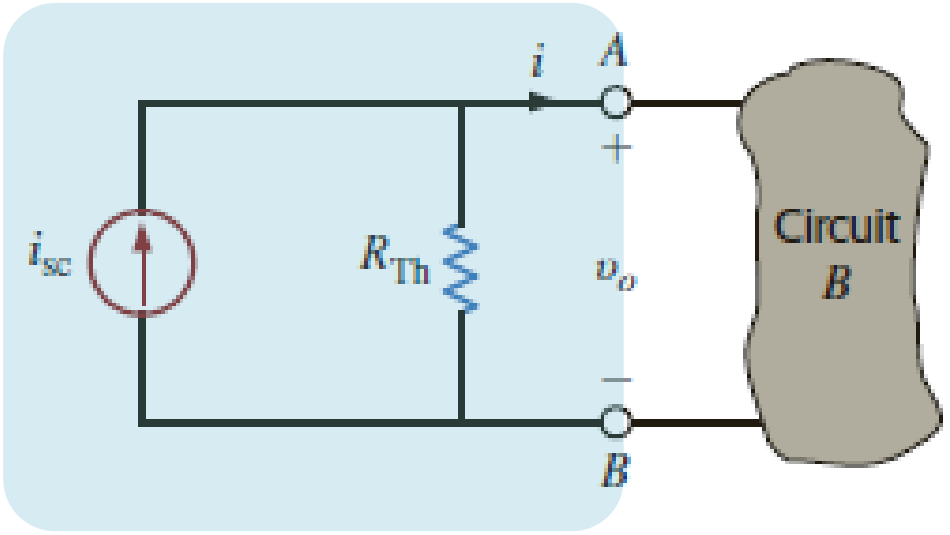
1) **Independent Sources Only**
   - **Find either V_{oc} or I_{sc}**
   - **R_{Th} can be extrapolated directedly from the network**
2) **Dependent Sources Only**
   - **The equivalent circuit is R_{Th} only**
   - **Find R_{th} through ohms law by placing an voltage/current source and measuring the current/voltage**
3) **Independent and Dependent Sources**
   - **Must calculate both the V_{OC} and I_{SC} to calculate R_{TH}.**
   - **Must not split the dependent source an its controlling variable**

Source Transformation

- **Thevenin**



- **Norton**

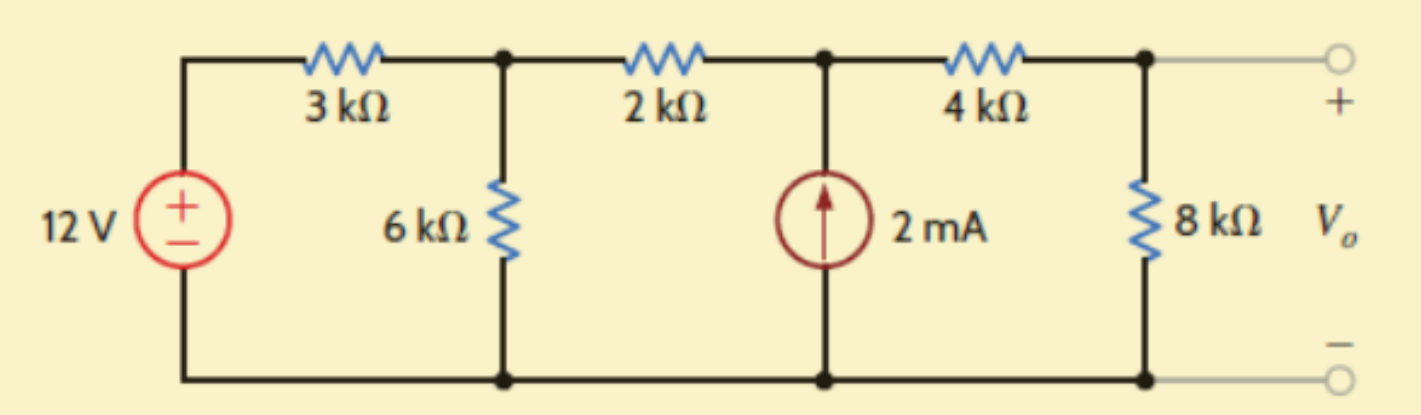


Thevenin and Norton Equivalent circuits are equivalent…
… hence source transformation is possible remembering

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

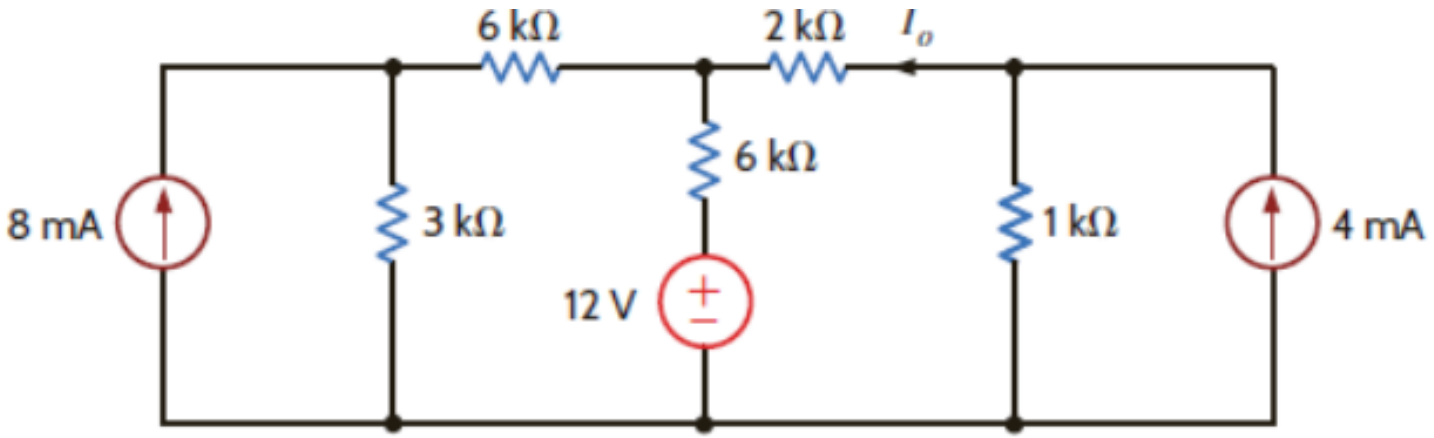
Learning Assessment → E5.13

Use source transformation to find V_0 in the network provided.



Learning Assessment → E5.15

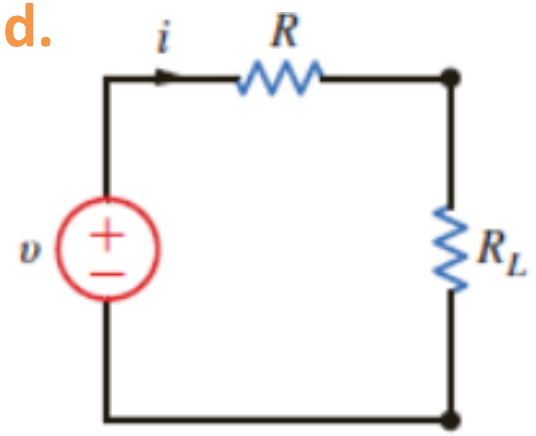
For the given network find I_0 using source transformation.

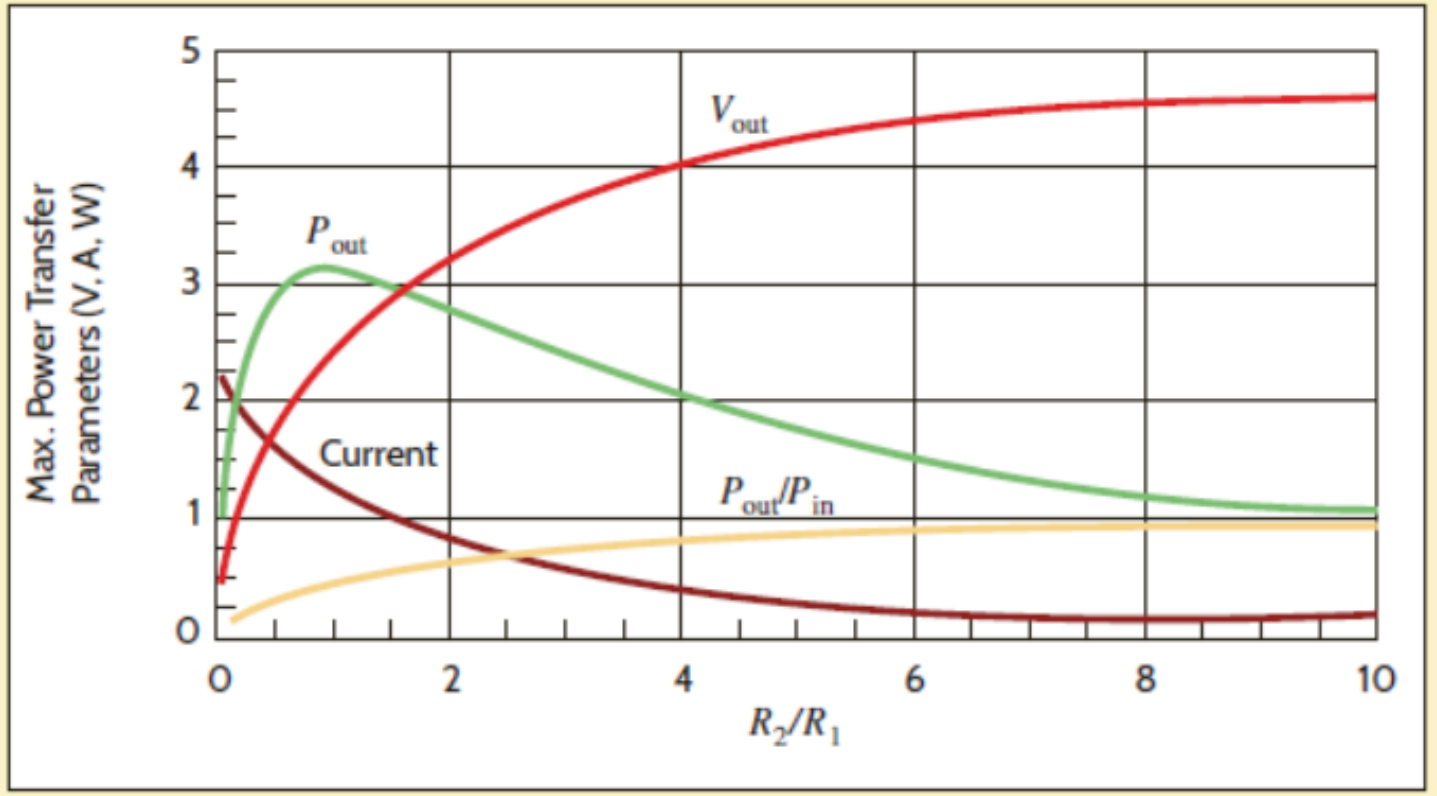


Maximum Power Transfer

Assuming v = 5V, R = 2Ω

Determine the value of RL such that maximum power is transferred from the source to the load.





$$P_L = \frac{V_L^2}{R_L} = R_L \left[\frac{v}{(R_L + R)}\right]^2$$

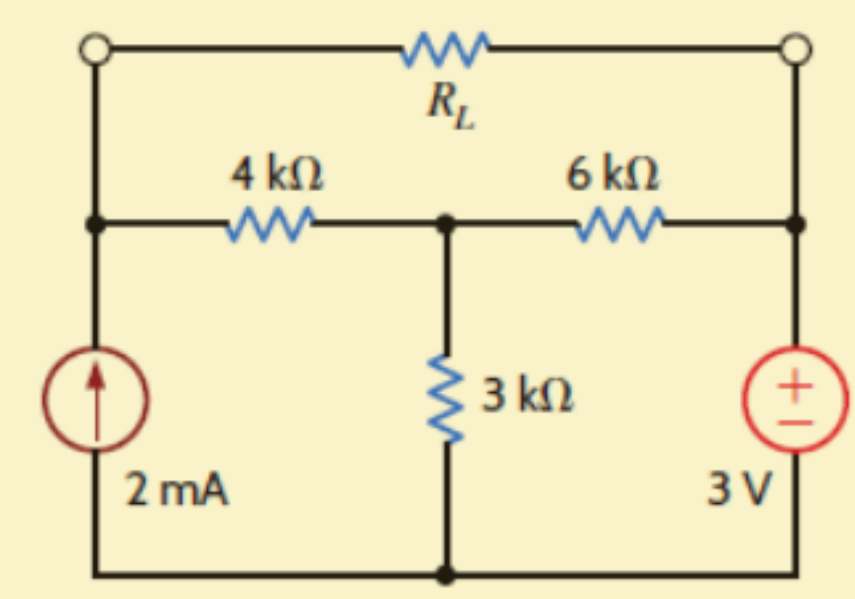
$$\frac{\delta P_L}{\delta R_L} = \left[\frac{v}{(R_L + R)}\right]^2 - 2 \cdot R_L \left[\frac{v}{(R_L + R)}\right]^2 \frac{1}{R_L + R}$$

$$\frac{\delta P_L}{\delta R_L} = 0 \rightarrow R_L = R$$

$$\eta = \frac{P_L}{P_{source}} = \frac{R_L}{R_L + R}$$

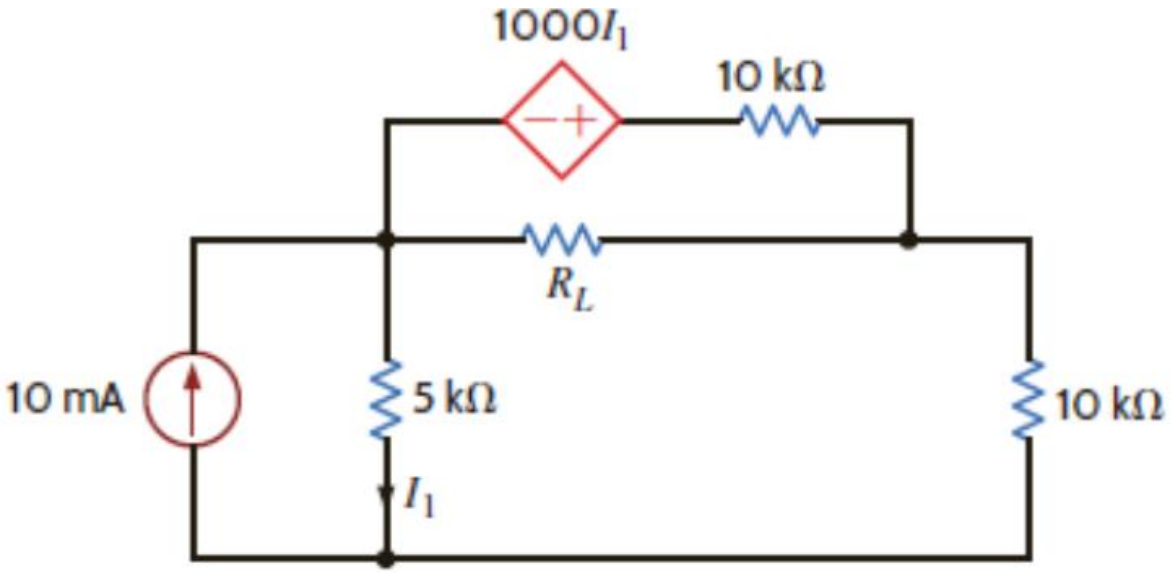
Example → 5.15

For the given network find the value of R_L for maximum power transfer and the maximum power that can be transferred to this load.



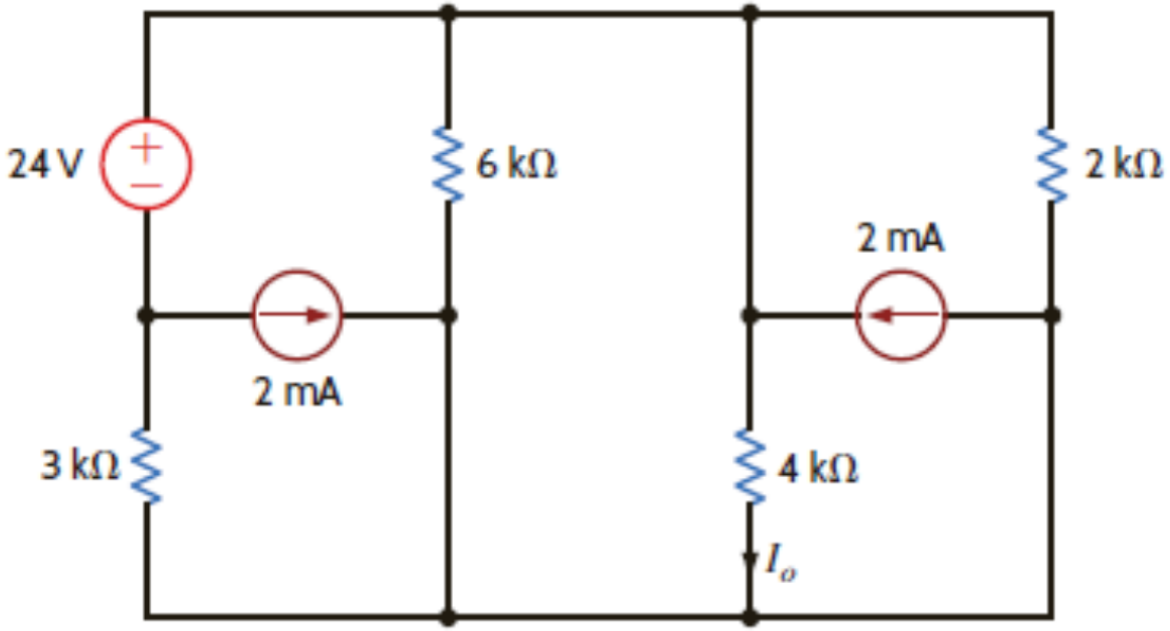
Problem → P5.124

For the given network find the value of R_L for maximum power transfer and the maximum power that can be transferred to this load.



Problem → P5.106

Using source transformation, find I_0 in the circuit provided.



Problem → P5.87

Find the Thevenin equivalent circuit of the provided network at terminals A-B.