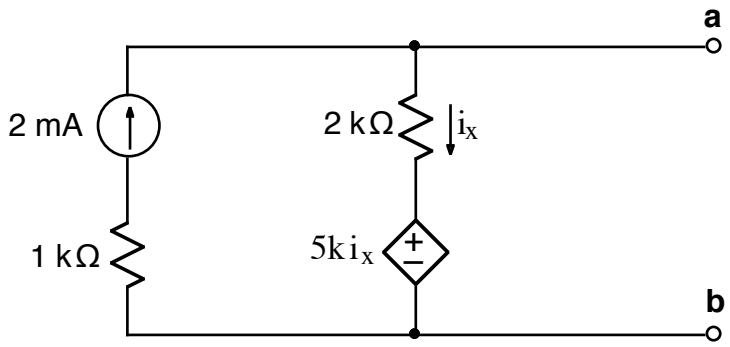
EX:



a) Find the Thevenin equivalent of the above circuit relative to terminals **a** and **b**.

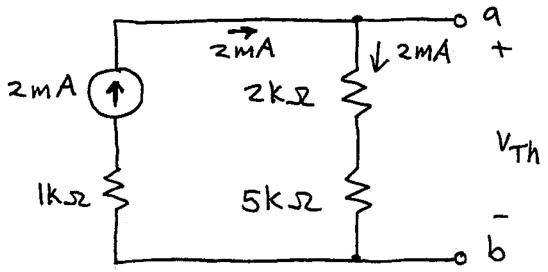
b) If we attach R_L to terminals **a** and **b**, find the value of R_L that will absorb maximum power.

c) Calculate the value of that maximum power absorbed by R_L.

Sol'n: a) We first observe that the dependent source is equivalent to a resistance:

$$R_{eq} = \frac{v}{i} = 5k\,\frac{i_x}{i_x} = 5k\Omega$$

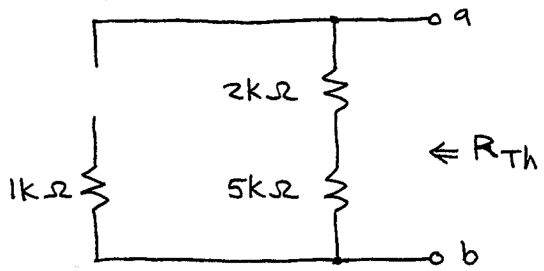
This equivalent resistance is valid regardless of what is connected between **a** and **b**.



$$V_{Th} = V_{a,b\ \text{open circuit}} = 2mA\cdot(2k\Omega+5k\Omega)$$

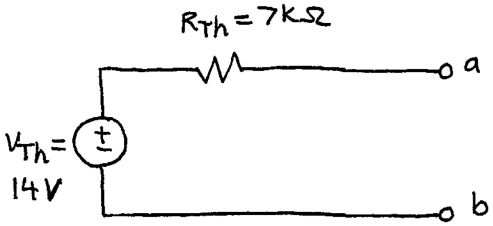
$$V_{Th} = 2mA\cdot 7k\Omega = 14V$$

We find R_{Th} by turning off is and looking in from a, b terminals.



$$R_{Th} = 2k\Omega + 5k\Omega = 7k\Omega$$

Thevenin equivalent:



b) $R_L = R_{Th} = 7k\Omega$ for max pwr

c) $$P_{max} = v_{R_L} \cdot i_{R_L} = \frac{V_{Th}}{2} \cdot \frac{V_{Th}}{2R_{Th}} = \frac{V_{Th}^2}{4R_{Th}}$$

$$P_{max} = \frac{(14V)^2}{4(7k\Omega)} = 7mW$$