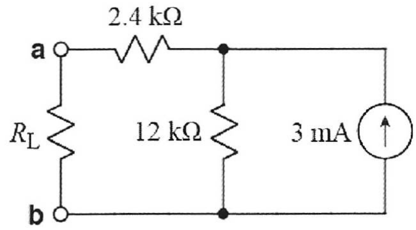
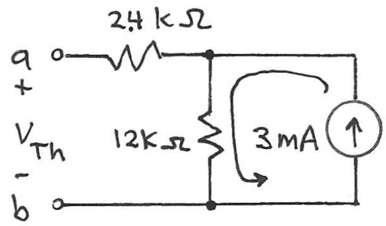
3.



a) Find the Thevenin equivalent of the above circuit (without R_L).

b) Find the power supplied by the current source when R_L is Not connected.

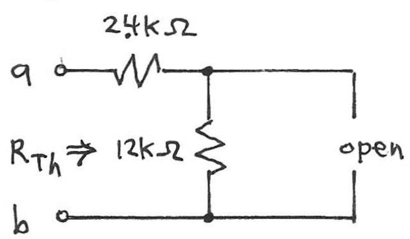
sol'n: a) $V_{Th} = V_{a,b}$ with no R_L



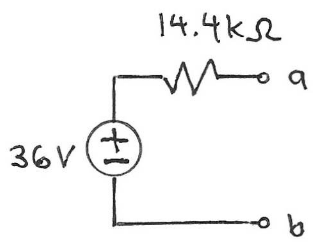
The 24kΩ carries no current and has no v-drop. Also, all the current from the i-src must flow thru the 12kΩ. So V_{Th} equals the v-drop across the 12kΩ, and the v-drop across the 12kΩ is $V_{Th} = 3mA \cdot 12k\Omega$:

$$V_{Th} = 36\ V$$

We find R_{Th} by turning off the i-src and looking in from a, b. $R_{Th} = 12k\Omega + 2.4k\Omega = 14.4k\Omega$.



Our Thevenin equivalent:



b) When R_L is not present, there is no current in the $2.4\,k\Omega$ resistor and no power consumed by it. The power supplied by the current source is the power consumed by the $12\,k\Omega$ resistor. From part (a), we know that $3\,mA$ flows in the $12\,k\Omega$, so we have the power from I^2R:

$$P_{i\text{-}src} = I^2R = (3\,mA)^2 \cdot 12\,k\Omega = 108\,mW$$