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.

\[
\text{sol'n: a) } V_{Th} = V_{a,b} \text{ with no } R_L
\]

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

\[
V_{Th} = 36 \, \text{V}
\]

We find $R_{Th}$ by turning off the i-src and looking in from $a, b$. $R_{Th} = 12\, \text{k}\Omega + 24\, \text{k}\Omega = 14.4\, \text{k}\Omega$.

Our Thevenin equivalent: $36\, \text{V}$
b) When $R_L$ is not present, there is no current in the 2.4 kΩ resistor and no power consumed by it. The power supplied by the current source is the power consumed by the 12 kΩ resistor. From part (a), we know that 3 mA flows in the 12 kΩ, so we have the power from $I^2R$:

$$P_{i-s} = I^2R = (3 \text{ mA})^2 \cdot 12 \text{ kΩ} = 108 \text{ mW}$$