This quiz problem is from HW#2 assignments (Prob. 2.28)

(A). (5 points) Determine $I_2$ in the circuit below when the 12V voltage source generates 48W of power.

\[ I_1 = \frac{48W}{12V} = 4 \, \text{[A]} \]
\[ I_2 = 0.25I_1 = 0.25 \times 4 = 1 \, \text{[A]} \]
\[ I_2 = I_1 - I_3 = 4 - 1 = 3 \, \text{[A]} \]

To find $R$, consider the first loop.

\[ -12 + R I_2 + R I_1 = -12 + R \times 3 + R \times 4 = 0 \]
\[ \Rightarrow R = \frac{12}{7} \, \text{[Ω]} \]

(B). (5 points) Determine the “total power consumed” in this circuit- Please show how you got this value.

Power Consumed = \[ R I_2^2 + R I_1^2 + R I_3^2 + R \frac{V_{dep}}{R} \]
\[ + 0.25 I_1 \, \text{(voltage across dependent source)} \]

\[ V_{dep} = 3 \]
\[ R I_2 = R I_3 + V_{dep} + R I_3 \]
\[ 3R = R + V_{dep} + R \]
\[ V_{dep} = R I_1 = \frac{12}{7} \, \text{[V]} \]

\[ \text{Power Consumed} = \frac{12}{7} \left( 3^2 \right) + \frac{12}{7} \left( 4 \right)^2 + 2 \times \frac{12}{7} \left( 1 \right) + \frac{12}{7} \left( 1 \right) \]
\[ = \frac{12}{7} (9 + 16 + 2 + 1) = \frac{12}{7} \times 28 = \frac{12 \times 28}{7} = 48 \, \text{W} \]