P2.10 The 20-Ω and 30-Ω resistances are in parallel and have an equivalent resistance of \( R_{eq1} = 12 \) Ω. Also the 40-Ω and 60-Ω resistances are in parallel with an equivalent resistance of \( R_{eq2} = 24 \) Ω. Next we see that \( R_{eq1} \) and the 4-Ω resistor are in series and have an equivalent resistance of \( R_{eq3} = 4 + R_{eq1} = 16 \) Ω. Finally \( R_{eq3} \) and \( R_{eq2} \) are in parallel and the overall equivalent resistance is

\[
R_{eq} = \frac{1}{1/R_{eq1} + 1/R_{eq2}} = 9.6 \, \Omega
\]

P2.11 The 20-Ω and 30-Ω resistances are in parallel and have an equivalent resistance of \( R_{eq1} = 12 \) Ω which in turn is in series with the 8-Ω resistance resulting in an equivalent resistance of \( R_{eq2} = R_{eq1} + 8 = 20 \) Ω. Next \( R_{eq2} \) is in parallel with the 20-Ω resistance resulting in an equivalent resistance \( R_{eq3} = 10 \) Ω which in turn is in series with the 7-Ω resistance resulting in an overall equivalent resistance of \( R_{eq} = 17 \) Ω.

P2.25 \( i_1 = \frac{R_2}{R_1 + R_2} \cdot i_s = 1 \, A \)

\( i_2 = \frac{R}{R_1 + R_2} \cdot i_s = 2 \, A \)

P2.26 (a) \( R_1 + R_2 = \frac{12 \, V}{0.1 \, A} = 120 \, \Omega \)

\[
\frac{R_2}{R_1 + R_2} \times 12 = 5
\]

Solving, we find \( R_2 = 50 \, \Omega \) and \( R_1 = 70 \, \Omega \).

(b)

The equivalent resistance for the parallel combination of \( R_2 \) and the load is

\[
R_{eq} = \frac{1}{\frac{1}{50} + \frac{1}{200}} = 40 \, \Omega
\]

Then using the voltage division principle, we have

\[
\nu_o = \frac{R_{eq}}{R_1 + R_{eq}} \times 12 \, V = 4.364 \, V
\]
P2.37 First we can write \( i_x = \frac{v_1}{10} \). Then writing KVL, we have \( v_1 - 5i_x - v_2 = 0 \).

Writing KCL at the reference node, we have \( i_x + \frac{v_2}{20} = 8 \). Using the first equation to substitute for \( i_x \) and simplifying, we have

\[
0.5v_1 - v_2 = 0
\]
\[
2v_1 + v_2 = 160
\]

Solving, we find \( v_1 = 64 \), \( v_2 = 32 \), and \( i_x = \frac{v_1}{10} = 6.4 \) A.

P2.47 Mesh equations:

\[
i_1 = 10 \text{ A}
\]
\[
15(i_2 - i_1) + 5i_2 = 0
\]

Solving, we find \( i_2 = 7.5 \) A.

However, \( i_2 \) shown in Figure P2.30 is the same as \( i_2 \), so the answer is \( i_3 = 7.5 \) A.