problem 1 solution

$$R = v^2 / P = \frac{14400}{80}\Omega = 180\Omega$$

problem 2 solution

$(a)\quad \mathrm{i} = 15/80 = 0.187.5A = 187.5\mathrm{mA}$

$(\mathrm{b})\quad \mathrm{i} = 15/75 = 0.2A = 200\mathrm{mA}$

problem 3 solution

$i_1 = -6 + 11\ A = 5A$

$i_2 = 11 - 5\ A = 6A$

$i_3 = 13 - i_2 = 13 - 6\ A = 7A$

problem 4 solution

$-10 - 25 + 25 + v_1 = 0 \quad \Rightarrow \quad \mathrm{v}_1 = 10V$

$20 - 25 - v_2 = 0 \quad \Rightarrow \quad \mathrm{v}_2 = -5V$

$-v_1 + v_2 + v_3 = 0 \quad \Rightarrow \quad \mathrm{v}_3 = 15V$

problem 5 solution

$-18 + \mathrm{v} + 3 = 0 \quad \Rightarrow \quad \mathrm{v} = 15V$

$-3 + 12 + 3i_x = 0 \quad \Rightarrow \quad 3\mathrm{i}_x = -9 \quad \Rightarrow \quad \mathrm{i}_x = -3A$

problem 6 solution

$-22 + 3I - 8 + 5I + 6 = 0$

$I = 3A$

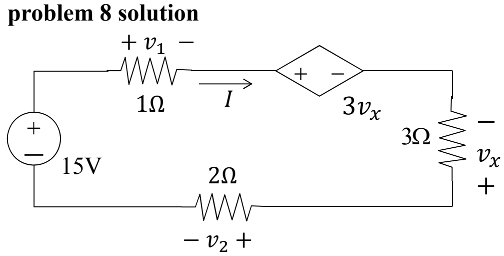
$-V_{ab} + 5I + 6 = 0 \quad \Rightarrow \quad \mathrm{V}_{ab} = v_2 + 6 = 5 \times 3 + 6\ V = 21V$

problem 7 solution

$-36 + 4i_0 + 5i_0 + 3i_0 = 0$

$i_0 = 3A$

problem 8 solution



Assign loop current I.
Assign v_1, v_2 by passive sign convention.
By Ohm's Law,
$v_1 = I, v_2 = 2I$
Since I enters "$-$" of v_x,
$v_x = -3I$.

KVL along clockwise direction: $v_1 + 3v_x - v_x + v_2 - 15 = 0$,

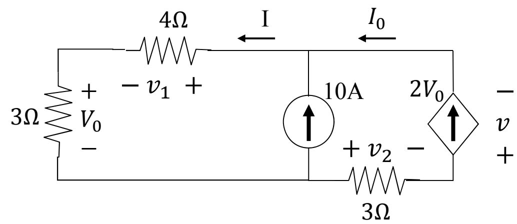
$I + 3v_x - v_x + 2I - 15 = 0$

$I + 3(-3I) - (-3I) + 2I - 15 = 0$

$-3I = 15$

$\boxed{I = -5A, \qquad v_x = -3(-5) = 15V}$

problem 9 solution



Assign v, v_1, v_2, I_0

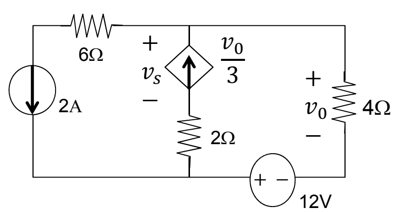
By KCL, same current I flows through 4Ω and 3Ω resistor on left side.
By Ohms Law, $I = \frac{V_0}{3}$. By the dependent current source, $I_0 = 2V_0$
By KCL at top node, $I = 10 + I_0, \Rightarrow \frac{V_0}{3} = 10 + 2V_0 \Rightarrow V_0 = -6V$
Thus, $I = \frac{V_0}{3} = -2A,\ v_1 = 4I = -8V.$
To find the power dissipated by the controlled source, assign v (passive sign).
Need v_2 to compute v. By Ohm's Law, $v_2 = 3(2V_0) = 3(-12) = -36V.$
By KVL along outer loop: $-v_1 - v - v_2 - V_0 = 0$

$$v = -v_1 - v_2 - V_0 = -(-8) - (-36) - (-6) = 50V$$

Power dissipated by controlled source $p = v \times 2V_0 = 50(-12) = -600W.$

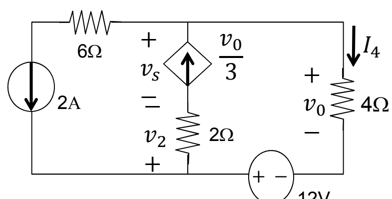
$$\boxed{V_0 = -6V, \quad p = -600W}$$

Problem 10 solution: Determine v_0 and v_s for the circuit below:



Main idea:
Express branch current in terms of v_o,
and use KCL to make an equation for v_o,
Then use KVL to find v_s

Assign current through 4Ω, I_4, voltage across 2Ω v_2, by passive sign convention



$$\boxed{v_0 = 24V; v_s = 28V}$$

By ohm's law: $I_4 = \frac{v_0}{4}$;
By KCL: $\frac{v_0}{3} = 2 + I_4 = 2 + \frac{v_0}{4}$
Solving above equation: $v_o = 24V$;
To find v_s, form KVL for the right loop:

$$v_0 - 12 + v_2 - v_s = 0;$$
$$v_s = v_0 - 12 + v_2$$

By Ohm's Law, $v_2 = 2 \times \frac{v_0}{3} = 2 \times \frac{24}{3} = 16V$
Thus, $v_s = 24 - 12 + 16 = 28V$

Note: the current through 2Ω, is the same as that through the dependent source, which is $v_0/3$