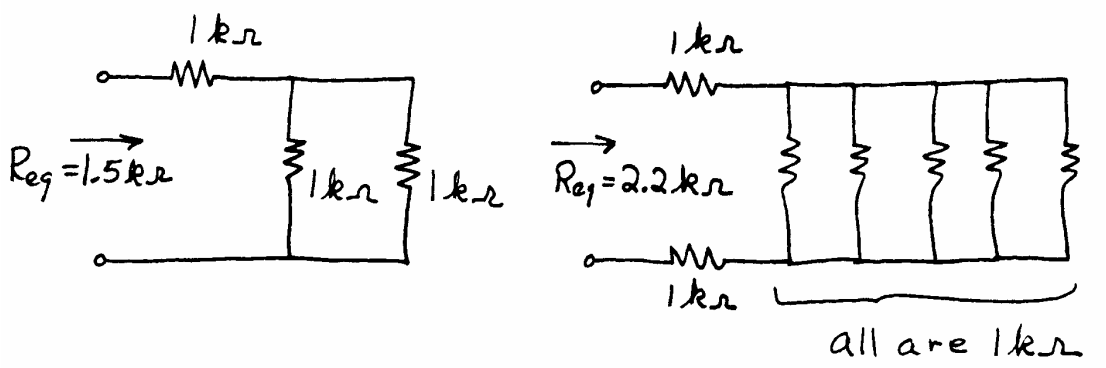
Homework # 2

P2.1* (a) $R_{eq} = 25\,\Omega$ (b) $R_{eq} = 25\,\Omega$

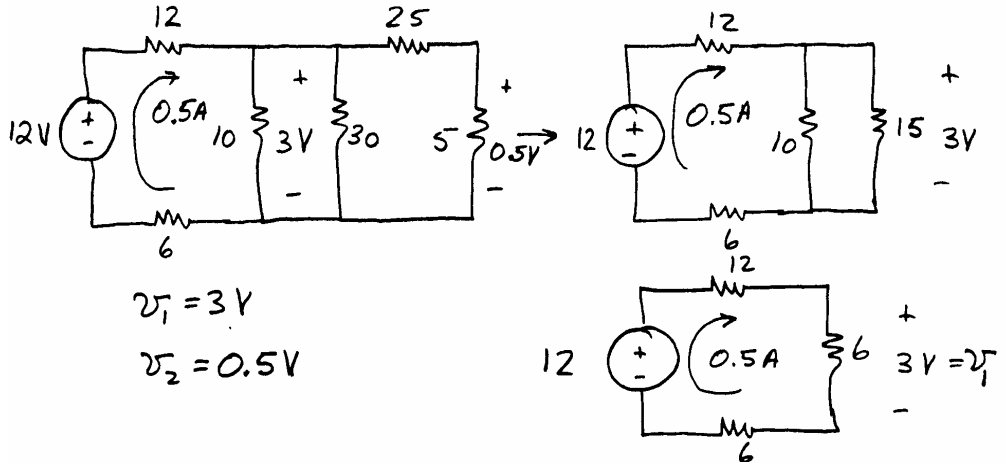
P2.4* The 2-Ω and 4-Ω resistances are in parallel having an equivalent resistance of 1.333 Ω. Similarly, the 1-Ω and 3-Ω resistances are in parallel and have an equivalent resistance of 0.75 Ω. Finally, the two parallel combinations are in series and we have

$$R_{ab} = 1.333 + 0.75 = 2.0833\ \Omega$$

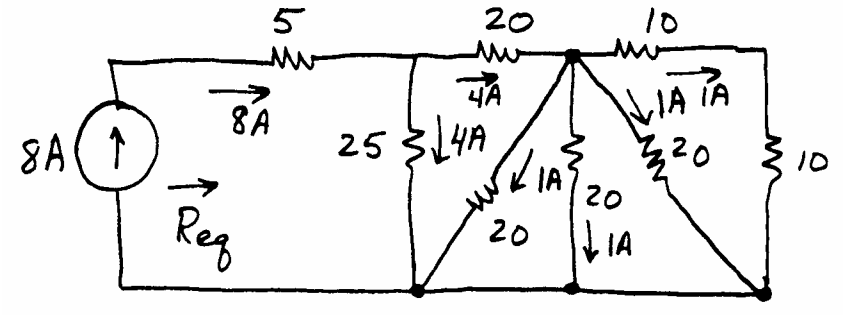
P2.6*



P2.13* We combine resistances in series and parallel until the circuit becomes an equivalent resistance across the voltage source. Then we solve the simplified circuit and transfer information back along the chain of equivalents until we have found the desired results.



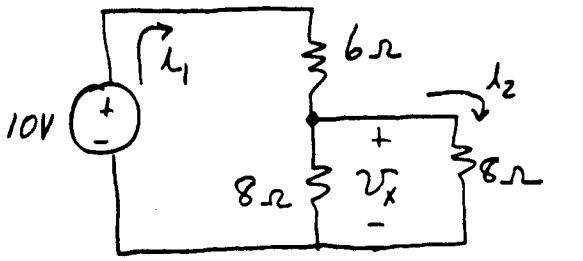
P2.15* Combining resistors in series and parallel, we find that the equivalent resistance seen by the current source is $R_{eq} = 17.5\ \Omega$. Thus, $v = 8 \times 17.5 = 140$ V. Also, $i = 1$ A.



P2.16* $i_1 = \dfrac{10}{R_{eq}} = \dfrac{10}{10} = 1\ A$

$v_x = 4$ V

$i_2 = \dfrac{v_x}{8} = 0.5\ A$



P2.21* $R_{eq} = \dfrac{1}{1/5 + 1/15} = 3.75\ \Omega \qquad v_x = 2\ A \times R_{eq} = 7.5$ V

$i_1 = v_x/5 = 1.5\ A \qquad i_2 = v_x/15 = 0.5\ A$

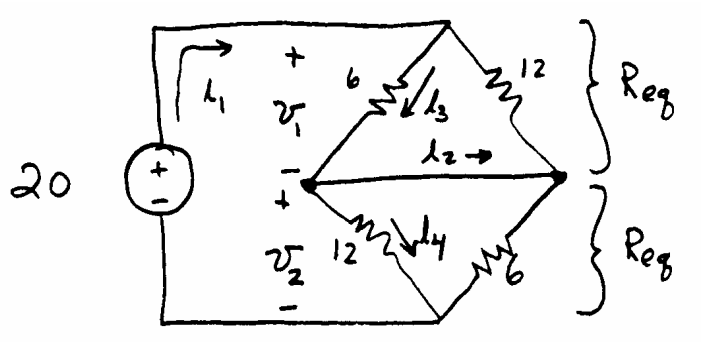
$P_{4A} = 4 \times 7.5 = 30$ W delivering

$P_{2A} = 2 \times 7.5 = 15$ W absorbing

$P_{5\Omega} = 7.5^2/5 = 11.25$ W absorbing

$P_{15\Omega} = (7.5)^2/15 = 3.75$ W absorbing

P2.23*



$$R_{eq} = \frac{1}{1/6 + 1/12} = 4\ \Omega \qquad i_1 = \frac{20\ \text{V}}{2R_{eq}} = 2.5\ A$$

$$v_1 = v_2 = R_{eq} i_1 = 10\ \text{V} \qquad i_3 = 10/6 = 1.667\ A$$

$$i_4 = 10/12 = 0.8333\ A \qquad i_2 = i_3 - i_4 = 0.8333\ A$$