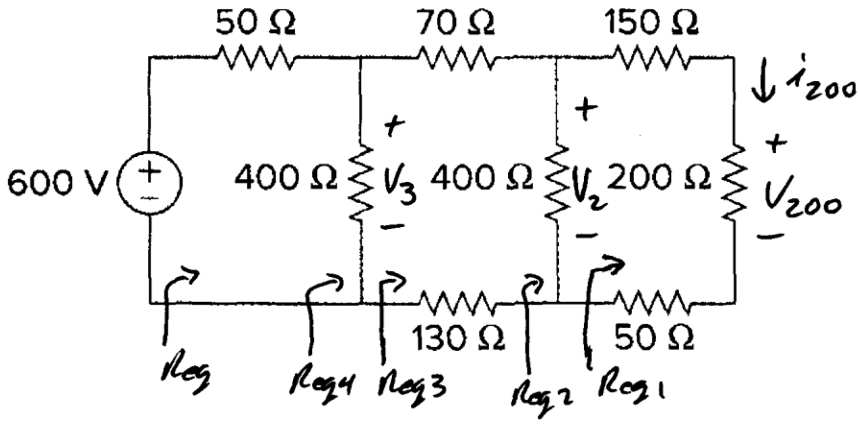
2.34 Using series/parallel resistance combination, find the equivalent resistance seen by the source in the circuit. Find the overall absorbed power by the resistor network.

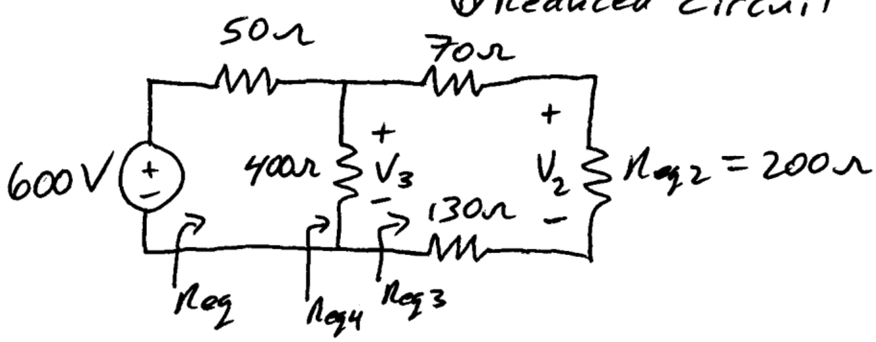


- Also, find the equivalent conductance G_{eq} seen by the voltage source as well as the current through and voltage across the 200 Ω resistor.

Series $R_{eq_1} = 150 + 200 + 50 = 400\Omega$

parallel $R_{eq_2} = 400 // R_{eq_1} = \left[\frac{1}{400} + \frac{1}{400}\right]^{-1} = 200\Omega$

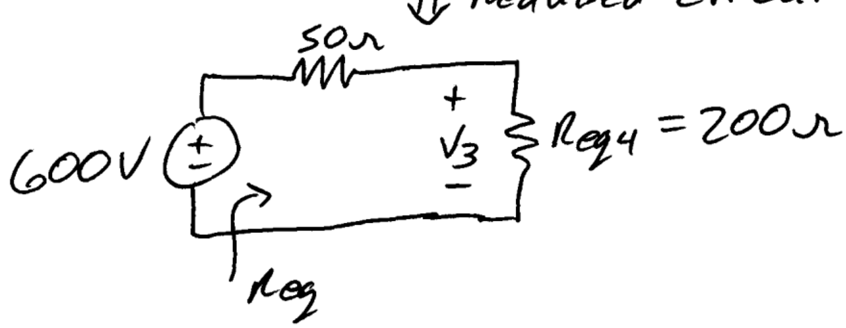
⇓ Reduced circuit



series $R_{eq_3} = 70 + R_{eq_2} + 130 = 70 + 200 + 130 = 400\Omega$

parallel $R_{eq_4} = 400 // R_{eq_3} = \left[\frac{1}{400} + \frac{1}{400}\right]^{-1} = 200\Omega$

⇓ Reduced circuit



series $R_{eq} = 50 + R_{eq4} = 50 + 200 \Rightarrow \underline{\underline{R_{eq} = 250\,\Omega}}$

$$G_{eq} = \frac{1}{R_{eq}} = \frac{1}{250} = 0.004\text{ S} \Rightarrow \underline{\underline{G_{eq} = 4\text{ mS}}}$$

Overall power $p = \frac{600^2}{R_{eq}} = \frac{600^2}{250} = \underline{\underline{1440\text{ W} = 1.44\text{ KW}}}$

Use voltage division to calculate V_3.

$$V_3 = 600\text{V}\ \frac{R_{eq4}}{R_{eq}} = 600\left(\frac{200}{250}\right) = 480\text{V}$$

Use voltage division to calculate V_2.

$$V_2 = V_3\ \frac{R_{eq2}}{R_{eq3}} = 480\ \frac{200}{400} = 240\text{ V}$$

Use voltage division to calculate V_{200}.

$$V_{200} = V_2\ \frac{200\,\Omega}{R_{eq1}} = 240\ \frac{200}{400}$$

$$\underline{\underline{V_{200} = 120\text{ V}}}$$

Use Ohm's Law to get i_{200}.

$$i_{200} = \frac{V_{200}}{200} = \frac{120}{200}$$

$$\underline{\underline{i_{200} = 0.6\text{ A} = 600\text{ mA}}}$$