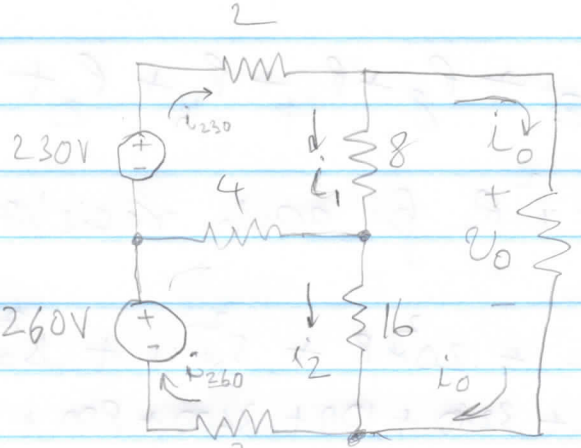
Chapter 2 : Network.

Pr 2.24



$i_1 = 20A$
$i_2 = 15A$

(a) find P_{230} & P_{260}. (b) show power supplied = power used

a) $i_1 = 20A$.
$i_2 = 15A$
Voltage across 80Ω resistor
$v_8 = i_1 * 8 + i_2 * 16$
$= 160V + 240V$
$v_o = 400V$.
Hence $i_o = 400/80 = 5$ Amps.

→ the current in the 230V source is:
$i_{230} = i_1 + i_o = 20 + 5 = 25$ Amps
→ the current in the 260V source is:
$i_{260} = i_2 + i_o = 15 + 5 = 20$ Amps

So $P_{230} = v \times i = 230 \times 25 = 5750$ W
$P_{260} = v \times i = 260 \times 20 = 5200$ W.
$\overline{10,950}$ W

(b) (b) All the loads are resistors.

Hence, $P_{used} = P_2 + P_8 + P_4 + P_{16} + P_2 + P_{80}$

Using $P = i^2 R$ for each resistor:

$$P_{used} = 25^2 * 2 + 20^2 * 8 + 5^2 * 4 + 15^2 * 16 + 20^2 * 2 + 5^2 * 80$$
$$= 1250 + 3200 + 100 + 3600 + 800 + 2000$$
$$= 10,950 \text{ W}$$

Hence, Power supplied = Power Used //

Pr 2:35

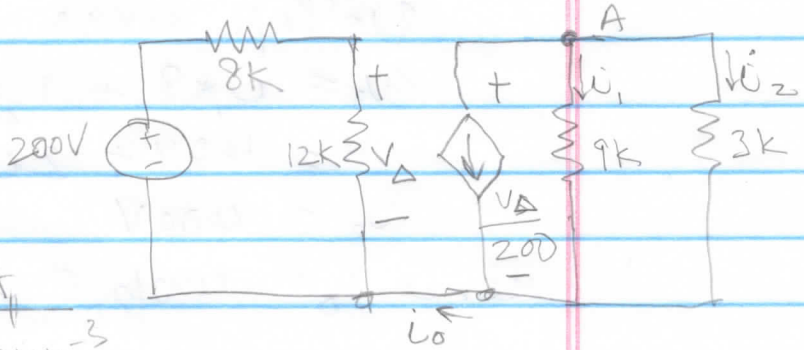
Find i_1 & i_2

a) i_o is 0

b) Current in the 12k resistor is

$$i = \frac{200}{8k + 12k} = 10 \text{ mA}$$

Hence $V_\Delta = 12000 \times 10 \times 10^{-3}$
$= 120$ volts



Therefore the current in the Dependent Current Source is:

$$i_D = \frac{120}{200} = 0.6 \text{ Amps}$$

Using KCL at node A:

$$0.6 + i_1 + i_2 = 0 \quad \rightarrow (1)$$

Also, $9i_1 = 3i_2$, so $i_2 = 3i_1$. (because they are in ||)

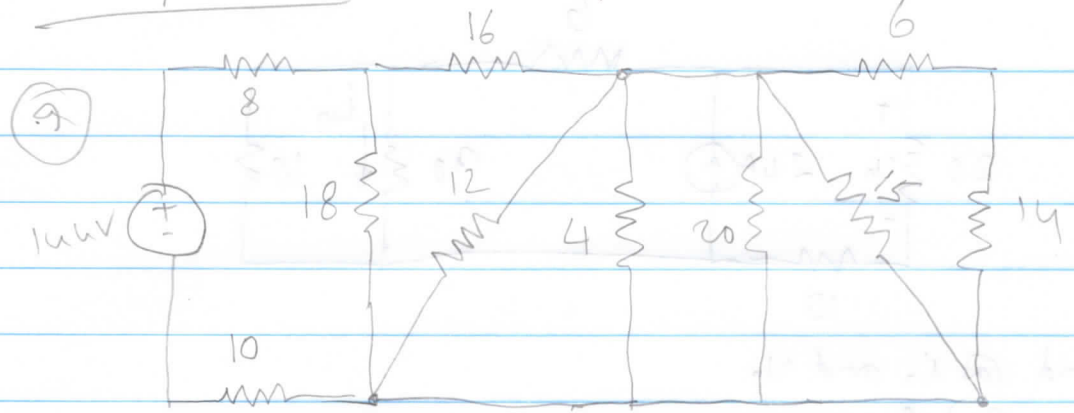
Hence, (1) becomes

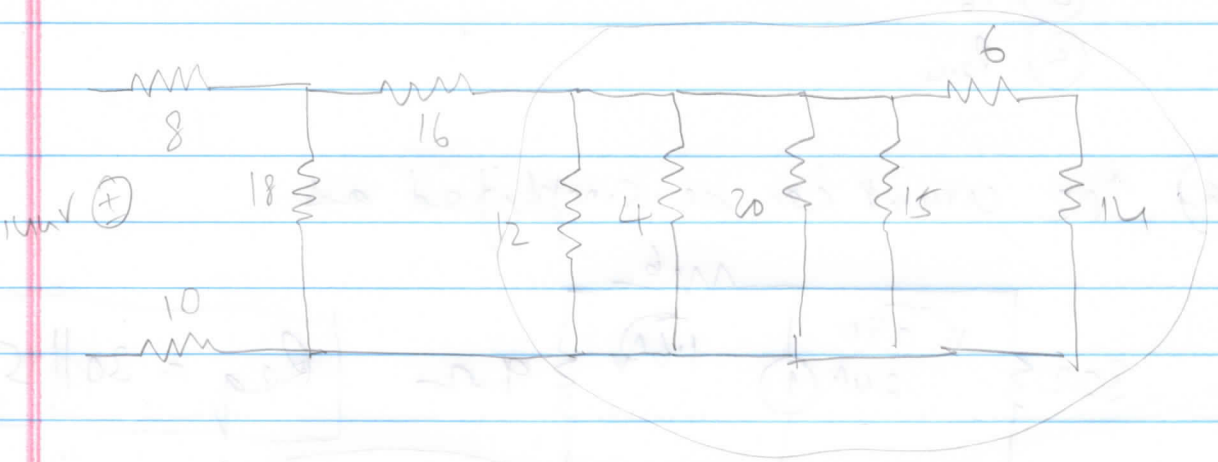
$$0.6 + i_1 + 3i_1 = 0, \text{ or } i_1 = -0.15 \text{ Amps}$$

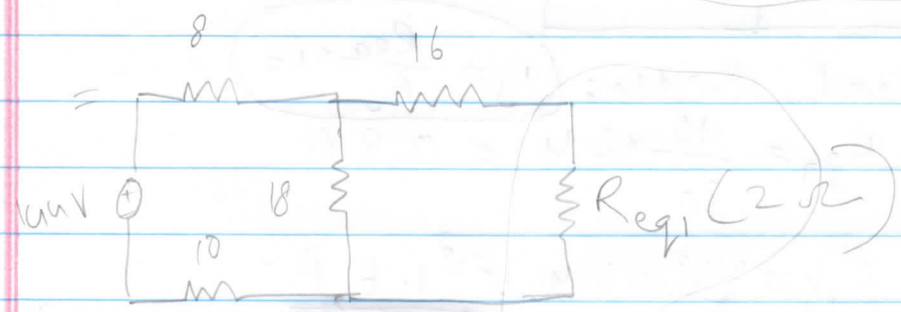
then, $i_2 = -0.45$ //

Chapter 3 Homework

Pr 3.76 (a)





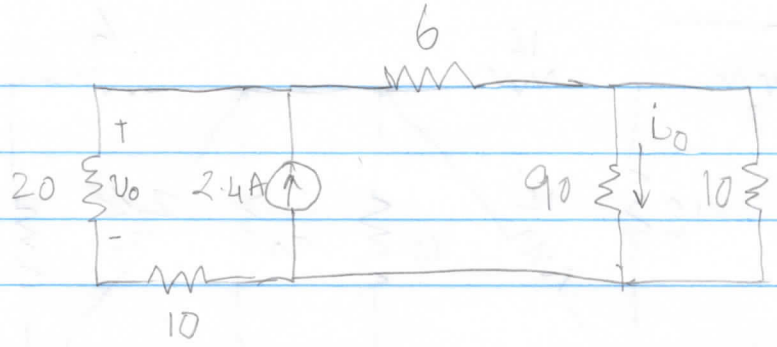


So $R_{eq} = 8 + 9 + 10$

$= 27\ \Omega$

(b) $P_{144} = \frac{V^2}{R} = \frac{144^2}{27} = 768$ Watts

3.19

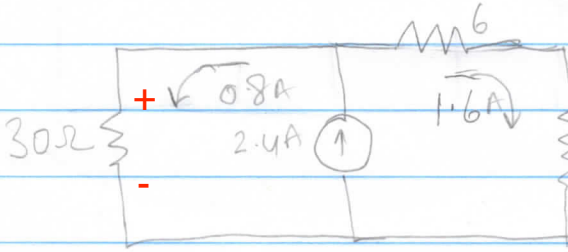


Find (a) i_o and v_o

(b) P_6

(c) $P_{2.4}$

(a) The circuit can be simplified as



$R_{eq} = 30 \| 15 = 10\Omega$

Using Current divider: $i_j = \frac{R_{eq} \times i_s}{R_j}$

$$i_{30} = \frac{10}{30} \times 2.4 = 0.8\ A$$

$$i_{15} = \frac{10}{15} \times 2.4 = 1.6\ A$$

2.4 (Total current)

Again using Current divider on the i_{15} branch

$$i_o = \frac{9}{90} \times 1.6 = 0.16\ \text{Amp} \Leftarrow$$

$$v_o = i_{30} \times R = 0.8 \times 20 = 16\ \text{volts} \Leftarrow$$

(b) $P_6 = i^2 R = 1.6^2 \times 6 = 15.36\ \text{Watts}$

(c) $P_{2.4} = -v*i = -(30*0.8) \times 2.4 = -57.6\ \text{Watts}$ - 57.6 W