ECE 100 Assignment 1

1.26) 30 days = 30 24 = 720 hours.

$\frac{\$60}{720\ hr.} \cdot \frac{1\ kW\,hr}{\$0.17} = 0.6944\ kW = \boxed{694.4\ W}$

$I = \frac{P}{V} = \frac{694.4\ W}{120\ V} = \boxed{5.787\ A}$

694.4W → 60W decrease is a $\frac{60}{694.4} = \boxed{8.64\ \%}$ decrease

1.55) $P = I^2R = V^2/R \rightarrow R = V^2/P = 100^2/100 = \boxed{100\ \Omega}$

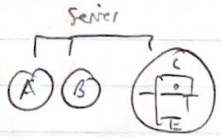
When V is reduced by 10% <=> $V' = \frac{9}{10}V$, $P' = 81/100\ P \Rightarrow \boxed{19\%}$ reduction

1.61) $P_{voltage\ source} = 10 \cdot (-2) = +20\ W$

$P_{current} = 10 \cdot (+2) = -20\ W$ voltage source absorbing power s/c CO

1.37) since $i_b = 2A$, $\boxed{i_a = -2A}$ since $i_b = 2A$ and it splits into $-i_c$ and 3A,

$\boxed{i_c = 1A}$ $i_e = 1A$ so $\boxed{i_d = 3+1 = 4A}$



A, B are in series, and those are in series with the parallel block (C, D, E)

1.33)

$i_a = 2A$
$i_b = 3A$
$i_c = 1A$ ← because $a+c=b$
$i_d = -5A$
$i_e = +5A$ ← $e+g=b+d$
$i_f = -3A$ ← $d+a=f$
$i_g = -7A$ ← $g=f-h$
$i_h = 4A$

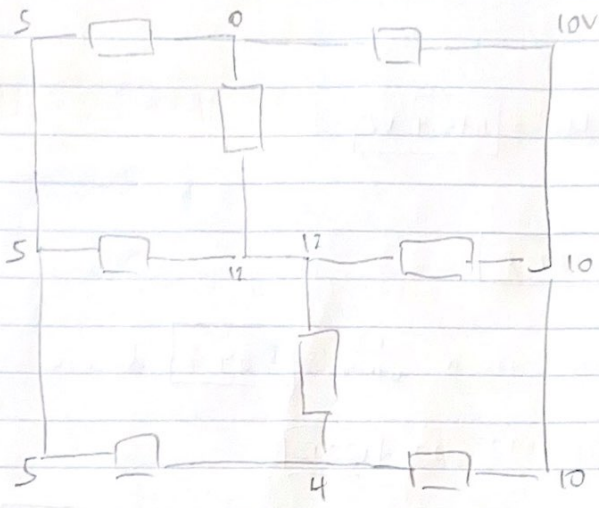
$i_f = i_g + i_h$

$i_h + i_c = i_e$
$i_e + i_g = i_b + i_d$ → $i_h + i_c + i_g = i_b + i_d$

$i_f + i_c = i_b + i_d$

$i_f = 3 - 5 - 1$

1.43)



assuming ground, we follow paths to get the final diagram

now, we can find

$V_d = 12 - 0 = 12V$

$V_c = 4 - 5 = -1V$

$V_e = 12 - 4 = 8V$

$V_g = 12 - 10 = 2V$

1.44)

A: $V = 10V$ $I = 2A$ $P = 20W$

D: $V = 4V$ $I = -1A$ $P = -4W$

C: $V = 4 - 0 = 4V$ $I = 2 - 1 = 1A$ $P = -4W$

B: $V = 4 - 10 = -6V$ $I = -I_a = -2A$ $P = -12W$

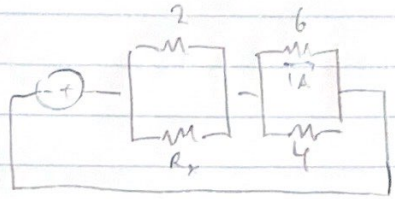
0W

$I_b = -2A$ $V_c = 4V$

$i_c = 1A$

$V_b = -6V$

(1.69) a) the circuit essentially looks like this



the $2/R_x$ pair and the $6/4$ pair and the battery are series.

b) the 2 & R_x are parallel
so is 6 and 4Ω resistors.

c) $6 \cdot 1A = 6V$ so $\frac{6V}{4\Omega} = 1.5A$ so total I through circuit =

$1.5 + 1. \; 2.5A$

$10V - 6V = 4V$ across 1st parallel $\frac{4V}{2\Omega} = 2A$ so other element

has $2.5A - 2A = 0.5A$ $\frac{4}{R_x} = 0.5$ so $R_x = \boxed{8\Omega}$

(1.70) a) $10 - 3 \cdot i_x - 5v_x = 0$

b) $10 - 3i_x - 5 \cdot (3 - i_x) = 0$ $\boxed{V_x = 3i_x = 1.67V}$

$I_t = \frac{10}{18} = \frac{5}{9} A$

$= \boxed{0.56 A}$

c) $P_{vs} = -10 \cdot 0.56 = \boxed{-5.6 W}$ $P_{vs} + P_R + P_{DVS} = 0 \checkmark$

$P_R = I^2R = 0.56^2 \cdot 3 = \boxed{+0.9259 W}$

$P_{DVS} = 0.56 \cdot 1.67V \cdot 5 = \boxed{+4.6296 W}$

1.75)

$$V_S - 3 \cdot I - 4 \cdot 1 - 2 \cdot 1 = 0$$

$$I = \frac{V_x}{2} + 1$$

$$\frac{V_x}{4} = 1 \qquad V_x = 4$$

$$I = 3$$

$$V_S = 9 + 4 + 2 = \boxed{15V}$$