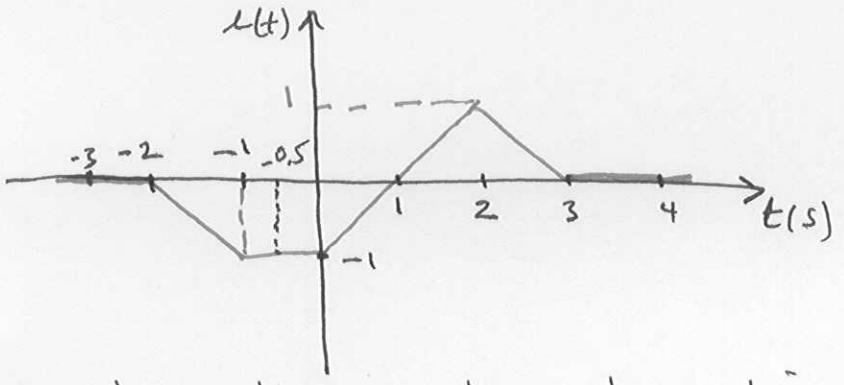
HW #1 Solution

1.31



The net positive charge transferred in the direction of the current at different values of t is the area under the curve $i(t)$ as $Q(t) = \int i(t)\,dt$

$\therefore$ $0 < t < 2s$ — Q is zero

$-2 < t < -1\,s$ — $Q_{at\,t=-1}$ is $\underline{-0.5C}$ i.e. $\int_{-2}^{t} (-t-2)\,dt$

$-1 < t < 0\,s$ — $Q(t) = \int_{-1}^{t} -1\,dt$ at $0s \rightarrow Q_{at=0}$ is $-1-0.5 = \underline{\underline{-1.5C}}$

$Q_{at\,-0.5}$ is $-0.5C - 0.5C = \underline{\underline{-1C}}$

$0 < t < 2s$ — $Q(t) = \int_{0}^{t} (t-1)\,dt$

$\therefore Q_{at\,t=1s} = -0.5 - 1.5 = -2.0C$

$Q_{at\,t=2s} = 0 - 1.5 = -1.5C$

$2 < t < 3s$ — $Q(t) = \int_{2}^{t} (-t+3)\,dt$

$\therefore Q_{at\,t=3} = 0.5 - 1.5 = -1C$

for $t > 3$ — $Q = -1C$

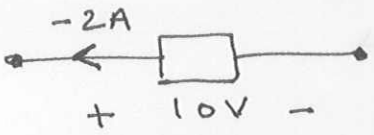
1.8-21

series resistances: [5, 6, 7]

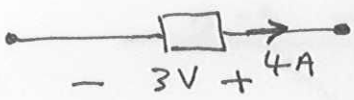
Parallel resistances (9 & 2), [1 & 3], [4 & 8]

HW #1 Solution (cont)

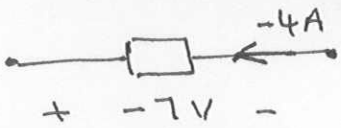
1.4-5

(a) 

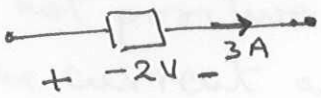
$p = -(-2 \times 10) = 20\,W$ (abs.)

(b) 

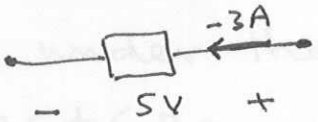
$p = -(4 \times 3) = -12\,W$ (del.)

(c) 

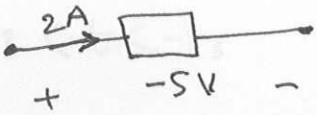
$p = -(-4 \times -7) = -28\,W$ (del.)

(d) 

$p = (3 \times -2) = -6\,W$ (del.)

(e) 

$p = (-3 \times 5) = -15\,W$ (del)

(f) 

$p = (2 \times -5) = -10\,W$ (del)

1.5-5:

$$\left.\begin{aligned} i_x + i_y &= 3\,A \\ 1 + i_y &= -2 - 4 \Rightarrow i_y = -7\,A \end{aligned}\right\} \Rightarrow i_x = 10\,A$$

1.6-2:

$-3 + 1 - v_z = 0 \Rightarrow v_z = \underline{-2\,V}$

$-1 - 3 + v_y = 0 \Rightarrow v_y = \underline{4\,V}$

$-v_y - v_x + (-4) = 0 \Rightarrow -4 - v_x - 4 = 0 \Rightarrow \underline{v_x = -8\,V}$

$v_z - (-4) - v_w = 0 \Rightarrow v_w = -2 + 4 = \underline{+2\,V}$

1.6-6:

$-v_w + 1 - 2 + 1 = 0 \Rightarrow \underline{v_w = 0\,V}$

$-3 + v_z - 1 = 0 \Rightarrow \underline{v_z = 4\,V}$

$-v_z + 2 - v_y = 0 \Rightarrow v_y = 2 - 4 = \underline{-2\,V}$

$-1 + 2 + v_y - v_x = 0 \Rightarrow v_x = 1 + v_y = \underline{-1\,V}$

1.7.2

Box1 $i = 2\,A$, $v = 4 - 2 = 2\,V \Rightarrow p_1 = -(2 \times 2) = -4\,W$

Box2 $i = 1\,A$ $v = 4\,V$ $p_2 = -(1 \times 4) = -4\,W$

Box3 $i = 3\,A$ $v = 4\,V$ $p_3 = +(3 \times 4) = 12\,W$

Box4 $i = 2\,A$ $v = 2\,V$ $p_4 = -(2 \times 2) = -4\,W$