**Chapter 1, Solution 16**

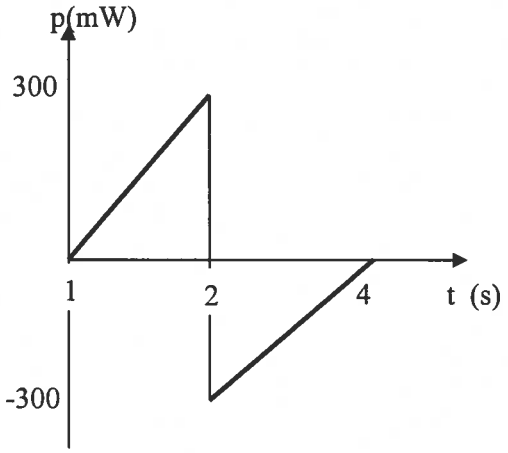
(a)

$$i(t) = \begin{cases} 30t \text{ mA}, & 0 < t < 2 \\ 120\text{-}30t \text{ mA}, & 2 < t < 4 \end{cases}$$

$$v(t) = \begin{cases} 5 \text{ V}, & 0 < t < 2 \\ -5 \text{ V}, & 2 < t < 4 \end{cases}$$

$$p(t) = \begin{cases} 150t \text{ mW}, & 0 < t < 2 \\ -600+150t \text{ mW}, & 2 < t < 4 \end{cases}$$

which is sketched below.




(b) From the graph of p,

$$W = \int_0^4 p\,dt = \underline{0 \text{ J}}$$

**Chapter 1, Solution 18**

$p_1 = 30(-10) = \mathbf{-300\ W}$
$p_2 = 10(10) = \mathbf{100\ W}$
$p_3 = 20(14) = \mathbf{280\ W}$
$p_4 = 8(-4) = \mathbf{-32\ W}$
$p_5 = 12(-4) = \mathbf{-48\ W}$

**Chapter 1, Solution 20**

$$p_{30 \text{ volt source}} = 30x(-6) = \mathbf{-180\ W}$$
$$p_{12 \text{ volt element}} = 12x6 = \mathbf{72\ W}$$
$$p_{28 \text{ volt e.ement with 2 amps flowing through it}} = 28x2 = \mathbf{56\ W}$$
$$p_{28 \text{ volt element with 1 amp flowing through it}} = 28x1 = \mathbf{28\ W}$$
$$p_{\text{the 5Io dependent source}} = 5x2x(-3) = \mathbf{-30\ W}$$

Since the total power absorbed by all the elements in the circuit must equal zero, or $0 = -180+72+56+28-30+p_{\text{into the element with Vo}}$ or

$$p_{\text{into the element with Vo}} = 180-72-56-28+30 = \mathbf{54\ W}$$

Since $p_{\text{into the element with Vo}} = V_o x3 = 54$ W or $V_o = \mathbf{18\ V}$.

**Chapter 1, Solution 26**

**(a)** $i = \dfrac{0.8\text{A} \cdot \text{h}}{10\text{h}} = \mathbf{80\ mA}$

**(b)** $\text{p} = \text{vi} = 6 \times 0.08 = \mathbf{0.48\ W}$

**(c)** $\text{w} = \text{pt} = 0.48 \times 10\ \text{Wh} = \mathbf{0.0048\ kWh}$

Chapter 1, Solution 3

(a) $q(t) = \int i(t)dt + q(0) = \underline{(3t + 1)\ C}$

(b) $q(t) = \int (2t + s)\, dt + q(v) = \underline{(t^2 + 5t)\ mC}$

(c) $q(t) = \int 20 \cos\left(10t + \pi/6\right) + q(0) = \underline{(2\sin(10t + \pi/6) + 1)\mu C}$

(d) $$q(t) = \int 10e^{-30t} \sin 40t + q(0) = \frac{10e^{-30t}}{900 + 1600}(-30 \sin 40t - 40 \cos t)$$
$$= \underline{-e^{-30t}(0.16\cos 40\ t + 0.12\ \sin 40t)\ C}$$