

### Problems

**3.1** For the circuit shown in Fig. P3.1a, suppose that  $i(t)$  is described by the function given in Fig. P3.1b. Sketch (a)  $v(t)$ , (b)  $w_L(t)$ , (c)  $p_R(t)$ , (d)  $v_R(t)$ , and (e)  $v_s(t)$ .

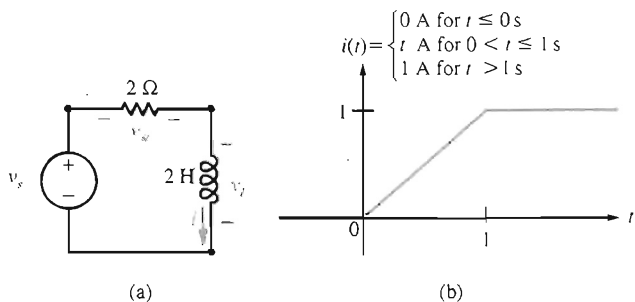


Fig. P3.1

**3.2** For the circuit shown in Fig. P3.1a, suppose that  $i(t)$  is described by the function given in Fig. P3.2. Sketch (a)  $v(t)$ , (b)  $w_L(t)$ , (c)  $p_R(t)$ , (d)  $v_R(t)$ , and (e)  $v_s(t)$ .

**3.3** For the circuit shown in Fig. P3.3, suppose that  $i(t)$  is described by the function given in Fig. P3.1b. Sketch (a)  $v(t)$ , (b)  $w_L(t)$ , (c)  $p_R(t)$ , (d)  $i_R(t)$ , and (e)  $i_s(t)$ .

**3.4** For the circuit shown in Fig. P3.3, suppose that  $i(t)$  is described by the function given in Fig. P3.2. Sketch (a)  $v(t)$ , (b)  $w_L(t)$ , (c)  $p_R(t)$ , (d)  $i_R(t)$ , and (e)  $i_s(t)$ .

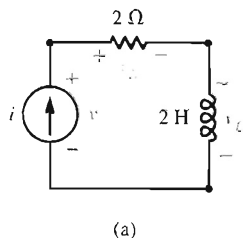


Fig. P3.5

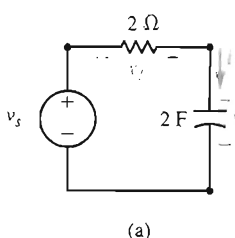


Fig. P3.7

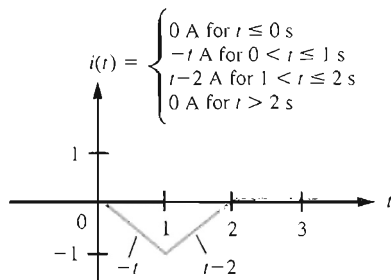


Fig. P3.2

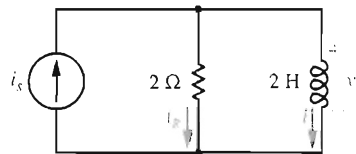


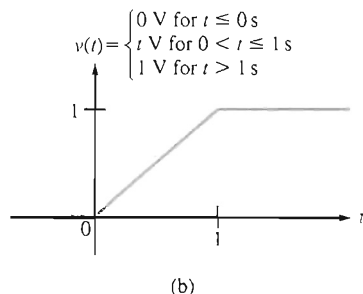
Fig. P3.3

**3.5** For the circuit shown in Fig. P3.5, suppose that  $i(t)$  is described by the function given in Fig. P3.1b. Sketch (a)  $v_R(t)$ , (b)  $v_L(t)$ , and (c)  $v(t)$ .

**3.6** For the circuit shown in Fig. P3.5, suppose that  $i(t)$  is described by the function given in Fig. P3.2. Sketch (a)  $v_R(t)$ , (b)  $v_L(t)$ , and (c)  $v(t)$ .

**3.7** For the circuit shown in Fig. P3.7a, suppose that  $v(t)$  is described by the function given in Fig. P3.7b. Sketch (a)  $i(t)$ , (b)  $w_C(t)$ , (c)  $p_R(t)$ , (d)  $v_R(t)$ , and (e)  $v_s(t)$ .

**3.8** For the circuit shown in Fig. P3.8, suppose that  $v(t)$  is described by the function given in Fig. P3.7b.



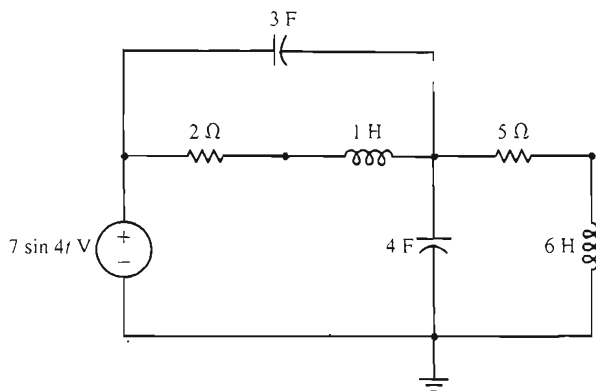


Fig. P3.26

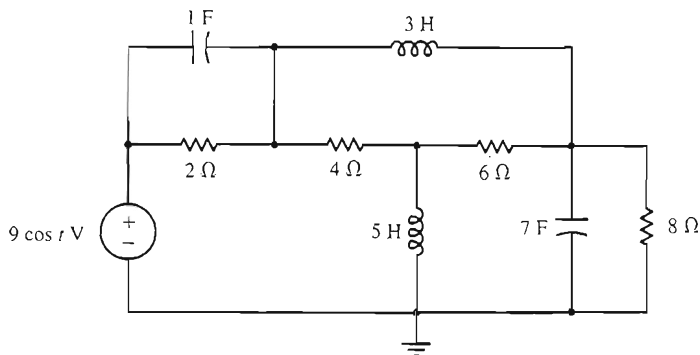


Fig. P3.27

**3.29** For the circuit shown in Fig. P3.28, replace the capacitor with a 5-H inductor. For the resulting circuit, the switch opens at time  $t = 0$  s. Write a differential equation in  $i(t)$  for  $t \geq 0$  s. Find  $i(t)$  and  $v(t)$  for all time and sketch these functions.

**3.30** For the circuit shown in Fig. P3.30, suppose that  $i_s(t) = 10$  A for  $t < 0$  s and  $i_s(t) = 0$  A for  $t \geq 0$  s. Write a differential equation in  $i(t)$  for  $t \geq 0$  s. Find  $i(t)$  and  $v(t)$  for all time and sketch these functions.

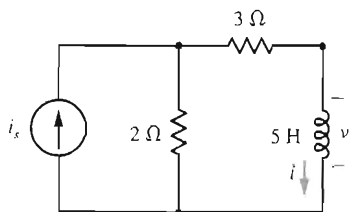


Fig. P3.30

**3.31** For the circuit shown in Fig. P3.30, replace the inductor with a 0.1-F capacitor. Suppose that  $i_s(t) = 10$  A for  $t < 0$  s and  $i_s(t) = 0$  A for  $t \geq 0$  s. Write a differential equation in  $v(t)$  for  $t \geq 0$  s. Find  $v(t)$  and  $i(t)$  for all time and sketch these functions.

**3.32** For the circuit shown in Fig. P3.32, suppose that  $v_s(t) = 18$  V for  $t < 0$  s and  $v_s(t) = 0$  V for  $t \geq 0$  s. Write a differential equation in  $i(t)$  for  $t \geq 0$  s. Find  $i(t)$  and  $v(t)$  for all time and sketch these functions.

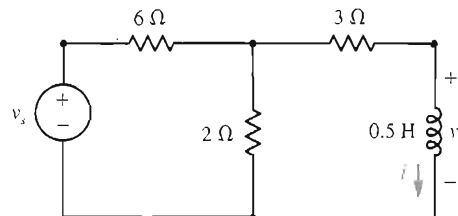


Fig. P3.32

**3.33** For the circuit shown in Fig. P3.32, replace the inductor with a  $\frac{1}{9}$ -F capacitor. Suppose that  $v_s(t) = 18$  V for  $t < 0$  s and  $v_s(t) = 0$  V for  $t \geq 0$  s. Write a differential equation in  $v(t)$  for  $t \geq 0$  s. Find  $v(t)$  and  $i(t)$  for all time and sketch these functions.

**3.34** For the circuit shown in Fig. P3.34, suppose that  $v_s(t) = 12$  V for  $t < 0$  s and  $v_s(t) = 0$  V for  $t \geq 0$  s. Write a differential equation in  $v(t)$  for  $t \geq 0$  s. Find  $v(t)$  and  $i(t)$  for all time and sketch these functions.

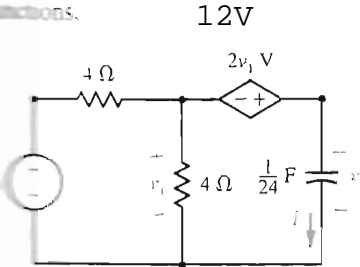


Fig. P3.34

**3.35** For the circuit shown in Fig. P3.34, replace the capacitor with a 3-H inductor. Suppose that

$v_s(t) = 12$  V for  $t < 0$  s and  $v_s(t) = 0$  V for  $t \geq 0$  s. Write a differential equation in  $i(t)$  for  $t \geq 0$  s. Find  $i(t)$  and  $v(t)$  for all time and sketch these functions.

**3.36** For the circuit shown in Fig. P3.36, the switch opens at time  $t = 0$  s. Write a differential equation in  $i(t)$  for  $t \geq 0$  s. Find  $i(t)$  and  $v(t)$  for all time and sketch these functions.

**3.37** For the circuit shown in Fig. P3.36, replace the inductor with a  $\frac{1}{8}$ -F capacitor. For the resulting circuit, the switch opens at time  $t = 0$  s. Write a differential equation in  $v(t)$  for  $t \geq 0$  s. Find  $v(t)$  and  $i(t)$  for all time and sketch these functions.

**3.38** For the circuit shown in Fig. P3.38, the switch opens at time  $t = 0$  s. Find  $v_1(t)$ ,  $v_2(t)$ ,  $i_1(t)$ ,  $i_2(t)$ , and  $v(t)$  for all time.

**3.39** For the circuit shown in Fig. P3.38, change the value of the 2-Ω resistor to 1 Ω. The switch in the circuit opens at time  $t = 0$  s. Find  $v_1(t)$ ,  $v_2(t)$ ,  $i_1(t)$ ,  $i_2(t)$ , and  $v(t)$  for all time.

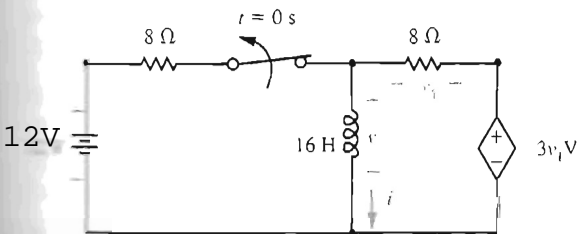


Fig. P3.36

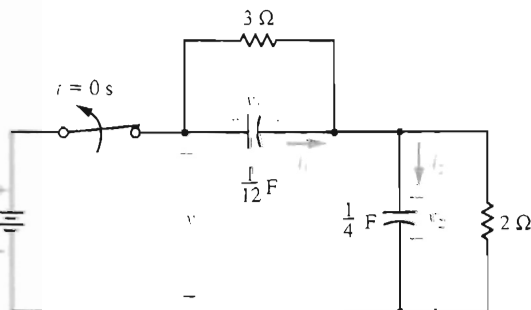


Fig. P3.38