Important Remarks

- Homework is due on March 27 at the beginning of class.

1. Problem 4.16
2. Problem 4.20
3. Problem 5.3
4. Problem 5.27

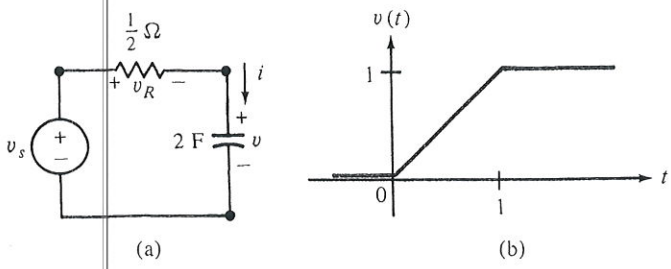

Fig. P4.14

4.13 Repeat Problem 4.12 for the voltage given in Problem 4.11.

4.14 Given the circuit and voltage shown in Fig. P4.14(a) and P4.14(b), respectively, sketch $i(t)$, $w_C(t)$, $p_R(t)$, $v_R(t)$, and $v_s(t)$.

4.15 Given the circuit shown in Fig. P4.12, suppose that the voltage $v(t)$ is described by the function given in Fig. P4.14(b). Find $i_C(t)$, $w_C(t)$, $p_R(t)$, $i_R(t)$, and $i_s(t)$, and sketch these functions.

4.16 Given the op-amp circuit shown in Fig. P4.16, suppose that $v(t)$ is described by the function given in Fig. P4.14(b). Sketch $i(t)$, $i_R(t)$, $v_R(t)$, $v_s(t)$, and $v_o(t)$.

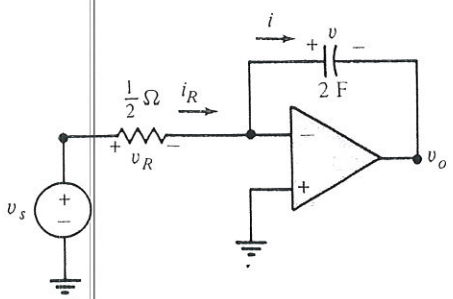

Fig. P4.16

4.17 Repeat Problem 4.16 for the case that there is an additional $\frac{1}{2}$-Ω resistor in parallel with the capacitor.

4.18 Repeat Problem 4.16 for the op-amp circuit shown in Fig. P4.18.

4.19 For the op-amp circuit given in Fig. P4.18, place an additional $\frac{1}{2}$-Ω resistor in parallel with the capacitor and repeat Problem 4.16.

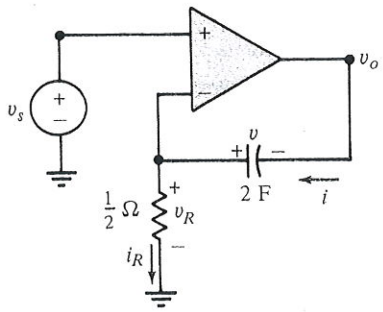

Fig. P4.18

4.20 Repeat Problem 4.16 for the op-amp circuit shown in Fig. P4.20.

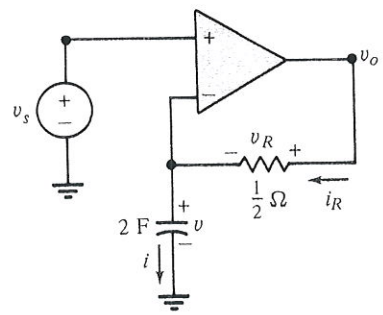

Fig. P4.20

4.21 For the op-amp circuit given in Fig. P4.20, place an additional $\frac{1}{2}$-Ω resistor in parallel with the capacitor and repeat Problem 4.16.

4.22 Verify the following:

(a) $[u(t)]^2 = u(t)$

(b) $[u(t-a)]^2 = u(t-a)$

(c) $[r(t)]^2 = t^2 u(t)$

(d) $[r(t-a)]^2 = (t-a)^2 u(t-a)$

5.3 For the circuit shown in Fig. P5.3, suppose that $v_s(t) = 15 - 15u(t)$ V. Find $v(t)$ and $i(t)$ for all t. Sketch these functions.

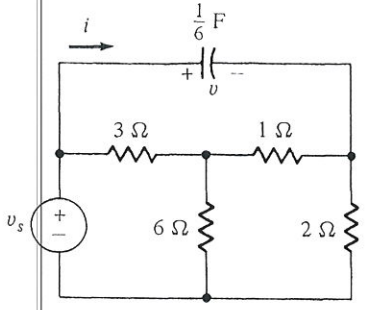

Fig. P5.3

5.4 For the circuit in Fig. P5.3, replace the capacitor with an 8-H inductor, change the 1-Ω resistor to 6 Ω, and suppose that $v_s(t) = 8 - 8u(t)$ V; then repeat Problem 5.3.

5.5 For the circuit given in Fig. DE5.2 (p. 226), replace the capacitor with a 10-H inductor. Find the current through the inductor and the voltage across the inductor for all t.

5.6 For the circuit shown in Fig. P5.6, find $v(t)$ and $i(t)$ for all t.

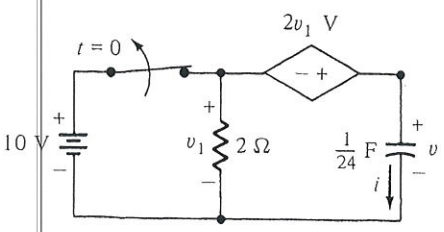

Fig. P5.6

5.7 For the circuit given in Fig. P5.6, connect a 6-Ω resistor in parallel with the capacitor, and repeat Problem 5.6.

5.8 For the circuit shown in Fig. P5.8, suppose that $v_s(t) = 9 - 9u(t)$ V. Find $i(t)$ and $v(t)$ for all t.

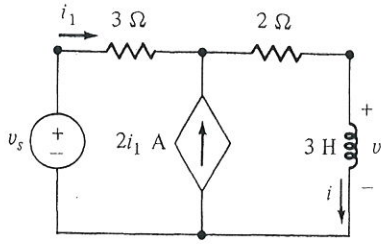

Fig. P5.8

5.9 For the circuit given in Fig. P5.8, replace the inductor with a 3-F capacitor, and repeat Problem 5.8.

5.10 For the op-amp circuit shown in Fig. P5.10, suppose that $i_s(t) = 1 - u(t)$ A. Find $v_C(t)$ and $v_o(t)$ for all t.

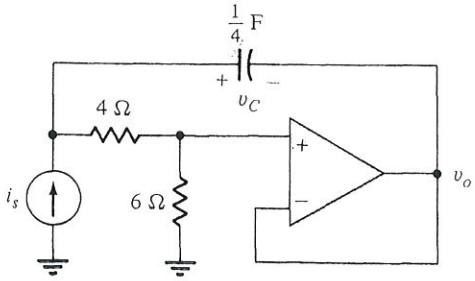

Fig. P5.10

5.11 For the op-amp circuit shown in Fig. P5.10, connect a 4-Ω resistor in parallel

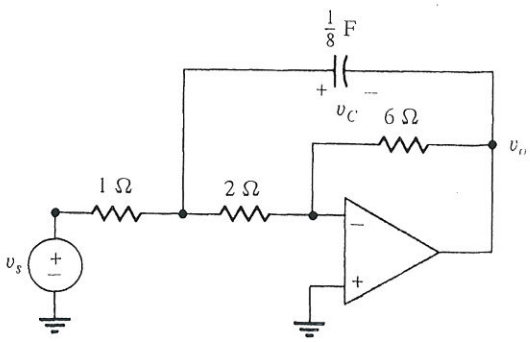

Fig. P5.12

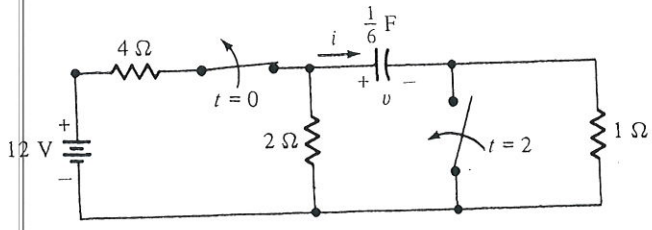

Fig. P5.20

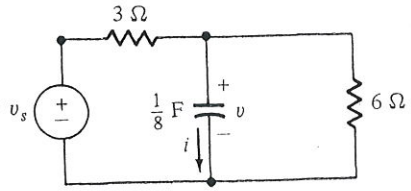

Fig. P5.22

5.21 For the circuit given in Fig. DE5.6 (p. 236), replace the 4-Ω resistor with a 3-H inductor, and repeat Drill Exercise 5.6.

5.22 For the circuit shown in Fig. P5.22, suppose that $v_s(t) = u(t)$ V. Find the zero-state step responses $v(t)$ and $i(t)$.

5.23 For the circuit shown in Fig. P5.22, replace the capacitor with a $\frac{1}{8}$-H inductor, and repeat Problem 5.22.

5.24 For the circuit given in Fig. P5.3, suppose that $v_s(t) = u(t)$ V. Find the zero-state step responses $v(t)$ and $i(t)$.

5.25 For the circuit given in Fig. P5.8, suppose that $v_s(t) = u(t)$ V. Find the zero-state step responses $i(t)$ and $v(t)$.

5.26 For the circuit given in Fig. P5.8, replace the inductor with a 3-F capacitor, and repeat Problem 5.25.

5.27 For the circuit shown in Fig. P5.27, suppose that $v_s(t) = 7u(t)$ V. Find the zero-state response $v(t)$.

5.28 For the op-amp circuit given in Fig. P5.10, suppose that $i_s(t) = u(t)$ A. Find the zero-state step responses $v_C(t)$ and $v_o(t)$.

5.29 For the op-amp circuit given in Fig. P5.12, suppose that $v_s(t) = u(t)$ V. Find the zero-state step responses $v_C(t)$ and $v_o(t)$.

5.30 For the op-amp circuit shown in Fig. P5.10, connect a 4-Ω resistor in parallel with the capacitor. Suppose that $i_s(t) = u(t)$ A. Find the zero-state step responses $v_C(t)$ and $v_o(t)$.

5.31 For the op-amp circuit shown in Fig. P5.12, connect an 8-Ω resistor in parallel with the capacitor. Suppose that $v_s(t) = u(t)$ V. Find the zero-state step responses $v_C(t)$ and $v_o(t)$.

5.32 For the op-amp circuit in Fig. P5.32, suppose that $R_1 = R_2 = R_3 = R$. Find the zero-state step response $v_o(t)$.

5.33 For the circuit given in Fig. P5.32, interchange capacitor C and resistor R_3 and repeat Problem 5.32.

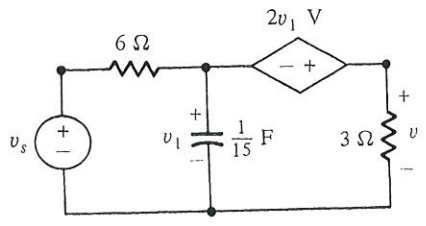

Fig. P5.27

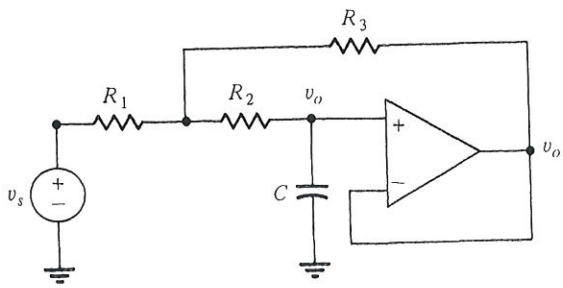

Fig. P5.32