# 6

## 5.15

✓ Answer

$$\begin{bmatrix} 100000 & -40000 \\ -40000 & 46000 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 10 \\ 2 \end{bmatrix}$$

$$I = \begin{bmatrix} \frac{9}{50000} \\ \frac{1}{5000} \end{bmatrix}$$

$$v_1 = -3000 i_2 = -\frac{3}{5}\ V$$

$$v_2 = 2000 i_1 + 3000 i_2 - 2 = \frac{11}{5}\ V$$

## 5.36

✓ Answer

$$\begin{bmatrix} r_1 & -r_1 \\ -r_1 & r_1 + r_2 + r_3 \end{bmatrix} \begin{bmatrix} i_0 \\ i_2 \end{bmatrix} = \begin{bmatrix} v_1 \\ 0 \end{bmatrix}$$

$$i_2 = \frac{i_0 r_1}{r_1 + r_2 + r_3}$$

$$i_2 = \frac{14}{3}\ mA$$

$$V_c = \frac{i_0 r_1 r_2}{r_1 + r_2 + r_3}$$

$$V_c = 14\ V$$

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$$\tau = R_{eq} C$$

$$R_{eq} = \frac{1}{r_2^{-1} r_3^{-1}}$$

$$\tau = \frac{c}{r_2^{-1} r_3^{-1}}$$

$$\tau = \frac{c}{r_2^{-1} r_3^{-1}}$$

$$\tau = \frac{600}{7}\ ms$$

$$v(t) = V e^{t/\tau}$$

$$v(t) = \frac{i_0 r_1 r_2}{r_1 + r_2 + r_3} e^{t / \frac{c}{r_2^{-1} r_3^{-1}}}$$

$$v(t) = 14 e^{70t/6}$$

## 5.41

✓ Answer

$V(0) = 16\frac{6}{8} = 12\ V$
$V(\infty) = 16\frac{4}{6} = \frac{32}{3}\ V$

$V(t) = \frac{32}{3} + \frac{4}{3}e^{-t/\tau}$
$\tau = \frac{4}{3}25\ ms$
$V(t) = \frac{32}{3} + \frac{4}{3}e^{-30t}$
$I(t) = \frac{8}{3} + \frac{1}{3}e^{-30t}\ mA$

## 5.28

✓ **Answer**
Source transform: $V_{eq} = 10\ V$
Resistor combine: $R_{eq} = 20\Omega$

$I = 0.5\ A$
$V_c = \frac{15}{2}\ V$

## 5.48

✓ **Answer**
At $t = 0$

Source transform: $V_{eq} = 10\ V$
Resistor combine: $R_{eq} = 5\Omega$
$I = 2\ A$

At $t = \infty$
$I = 0$

Resistor combine: $R_{eq} = 5\Omega$
$\tau = \frac{L}{R} = \frac{3}{100}\ s$

$I(t) = 2e^{-100t/3}$