Section 7.6

In Problems 1–12 use the Laplace transform to solve the given system of differential equations.

3.

$$\begin{aligned} \frac{dx}{dt} &= x - 2y \\ \frac{dy}{dt} &= 5x - y \\ x(0) = -1, \qquad & y(0) = 2 \end{aligned}$$

4.

$$\begin{aligned} \frac{dx}{dt} + 3x + \frac{dy}{dt} &= 1 \\ \frac{dx}{dt} - x + \frac{dy}{dt} - y &= e^t \\ x(0) = 0, \qquad & y(0) = 0 \end{aligned}$$

7.

$$\begin{aligned} &\frac{d^2x}{dt^2} + x - y = 0 \\ &\frac{d^2y}{dt^2} + y - x = 0 \\ &x(0) = 0, \qquad x'(0) = -2, \\ &y(0) = 0, \qquad y'(0) = 1 \end{aligned}$$

8.

$$\begin{aligned} \frac{d^2x}{dt^2} + \frac{dx}{dt} + \frac{dy}{dt} &= 0 \\ \frac{d^2y}{dt^2} + \frac{dy}{dt} - 4\frac{dx}{dt} &= 0 \\ x(0) = 1, \qquad & x'(0) = 0, \\ y(0) = -1, \qquad & y'(0) = 5 \end{aligned}$$

Section 4.9

In Problems 1–20 solve the given system of differential equations by systematic elimination.

5.

$$\begin{aligned} (D^2 + 5)x - \quad & 2y = 0 \\ -2x + (D^2 + 2) \quad & y = 0 \end{aligned}$$

7.

$$\frac{d^2x}{dt^2} = 4y + e^t$$
$$\frac{d^2y}{dt^2} = 4x - e^t$$

8.

$$\frac{d^2x}{dt^2} + \frac{dy}{dt} = -5x$$
$$\frac{dx}{dt} + \frac{dy}{dt} = -x + 4y$$

14.

$$\frac{dx}{dt} + \frac{dy}{dt} = e^t$$
$$-\frac{d^2x}{dt^2} + \frac{dx}{dt} + x + y = 0$$