

## 7.8 Exercises

**1–10** ■ Solve the differential equation or initial-value problem using the method of undetermined coefficients.

1.  $y'' + 3y' + 2y = x^2$
2.  $y'' + 9y = e^{3x}$
3.  $y'' - 2y' = \sin 4x$
4.  $y'' + 6y' + 9y = 1 + x$
5.  $y'' - 4y' + 5y = e^{-x}$
6.  $y'' + 2y' + y = xe^{-x}$
7.  $y'' + y = e^x + x^3$ ,  $y(0) = 2$ ,  $y'(0) = 0$
8.  $y'' - 4y = e^x \cos x$ ,  $y(0) = 1$ ,  $y'(0) = 2$
9.  $y'' - y = xe^{3x}$ ,  $y(0) = 0$ ,  $y'(0) = 1$
10.  $y'' + y' - 2y = x + \sin 2x$ ,  $y(0) = 1$ ,  $y'(0) = 0$

**11–12** ■ Graph the particular solution and several other solutions. What characteristics do these solutions have in common?

11.  $4y'' + 5y' + y = e^x$
12.  $2y'' + 3y' + y = 1 + \cos 2x$

**13–16** ■ Write a trial solution for the method of undetermined coefficients. Do not determine the coefficients.

13.  $y'' + 2y' + 6y = x^4 e^{2x}$

14.  $y'' + 6y' + 2y = x^3 + e^x \sin 2x$

15.  $y'' - 2y' + 2y = e^x \cos x$

16.  $y'' + 3y' = 1 + xe^{-3x}$

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**17–20** ■ Solve the differential equation using (a) undetermined coefficients and (b) variation of parameters.

17.  $y'' + 4y = x$

18.  $y'' - 3y' + 2y = \sin x$

19.  $y'' - 2y' + y = e^{2x}$

20.  $y'' - y' = e^x$

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**21–26** ■ Solve the differential equation using the method of variation of parameters.

21.  $y'' + y = \sec x$ ,  $0 < x < \pi/2$

22.  $y'' + y = \cot x$ ,  $0 < x < \pi/2$

23.  $y'' - 3y' + 2y = \frac{1}{1 + e^{-x}}$

24.  $y'' + 3y' + 2y = \sin(e^x)$

25.  $y'' - y = \frac{1}{x}$

26.  $y'' + 4y' + 4y = \frac{e^{-2x}}{x^3}$

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