First-Order Linear Differential Equations (CALC.DEQ.05)

Find the general solution of each differential equation.

1. $y' + y = 3$
2. $y' + \left(\frac{1}{x}\right) y = 9x + 4$
3. $y' + y = e^{-x}$
4. $y' + 4y = e^{4x}$
5. $y' - 2xy = e^{x^2}$
6. $2xy' + y = 10\sqrt{x}$
7. $y' + y \cot x = 2 \cos x$
8. $2xy' - 3y = 15x^3$
9. $xy' = 4y + x^5 \cos x$
10. $xy' + (2x - 3)y = 4x^4$

Find the particular solution that satisfies the initial condition.

11. $(1 + x)y' + y = \cos x \qquad y(0) = 2$
12. $xy' - 4y = 6x^3 \qquad y(2) = 24$
13. $y' = 1 + x + y + xy \qquad y(0) = 0$
14. $xy' + 3y = \frac{\ln x}{x^2} \qquad y(1) = 3$
15. $(x^2 + 9)y' + xy = 3x \qquad y(0) = 1$
16. $\sin x \cdot y' + y \cos x = \sin(2x) \qquad y\left(\frac{\pi}{2}\right) = 1$
17. $y' \cos^2 x + y = 4 \qquad y(0) = 8$
18. $2xy' - y = x^3 - x \qquad y(25) = 100$