In Problems 1–20 determine whether the given differential equation is exact. If it is exact, solve it.

3.
$$(5x + 4y)\,dx + \left(4x - 8y^3\right)\,dy = 0$$

7.
$$\left(x^2 - y^2\right)\,dx + \left(x^2 - 2xy\right)\,dy = 0$$

12.
$$\left(3x^2y + e^y\right)\,dx + \left(x^3 + xe^y - 2y\right)\,dy = 0$$

13.
$$x\frac{dy}{dx} = 2xe^x - y + 6x^2$$

In Problems 21–26 solve the given initial-value problem.

23)
$$(4y + 2t - 5)\,dt + (6y + 4t - 1)\,dy = 0,\ y(-1) = 2$$

In Problems 31–36 solve the given differential equation by finding, as in Example 4, an appropriate integrating factor.

31)
$$\left(2y^2 + 3x\right)\,dx + 2xy\ dy = 0$$

34)
$$\cos(x)dx + \left(1 + \frac{2}{y}\right)\sin(x)dy = 0$$

In Problems 37 and 38 solve the given initial-value problem by finding, as in Example 4, an appropriate integrating factor.

37)
$$x\ dx + \left(x^2y + 4y\right)\,dy = 0,\ y(4) = 0$$