



FIGURE 2.1.4 Integral curves of $2y' + ty = 2$; the green curve is a solution satisfying the initial condition $y(0) = 1$.

Problems

In each of Problems 1 through 8:

- G a.** Draw a direction field for the given differential equation.
 - b.** Based on an inspection of the direction field, describe how solutions behave for large t .
 - c.** Find the general solution of the given differential equation, and use it to determine how solutions behave as $t \rightarrow \infty$.
1. $y' + 3y = t + e^{-2t}$
 2. $y' - 2y = t^2 e^{2t}$
 3. $y' + y = t e^{-t} + 1$
 4. $y' + \frac{1}{t}y = 3 \cos(2t), \quad t > 0$
 5. $y' - 2y = 3e^t$
 6. $ty' - y = t^2 e^{-t}, \quad t > 0$
 7. $y' + y = 5 \sin(2t)$
 8. $2y' + y = 3t^2$

In each of Problems 9 through 12, find the solution of the given initial value problem.