6.1 Differential Equations, Initial Value Problems, and Slope Fields

Find the general solution to the initial value problem.

1. $\frac{dy}{dx} = 3x^2 + \cos x$

2. $\frac{dy}{dx} = \frac{1}{x^3} + \frac{1}{x}$

3. $\frac{dy}{dx} = -\frac{1}{x^2+1} + e^{-2x}$

4. $\frac{du}{dx} = e^{\sin x} \bullet \cos x$

Solve the initial value problem. Find the particular solution.

5. $\frac{dy}{dx} = 4\cos x;\ y = 3\ when\ x = \frac{\pi}{2}$

6. $\frac{dy}{dx} = x^2 + \sqrt{x};\ y = 4\ when\ x = 9$

7. $\frac{dy}{dx} = \sin x;\ f(0) = 4$

8. $\frac{dy}{dx} = \frac{1}{x} + 8;\ y = 0\ \ when\ \ x = e$

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Solve the initial value problem. You will have an integral in your solution.

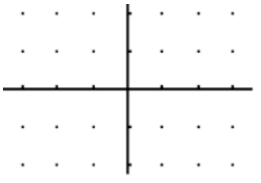
9. $\frac{dy}{dx} = \tan^2 x;\ y = 4\ \ when\ \ x = 3$

10. $\frac{dy}{dx} = \cos e^x;\ f(2) = 9$

What does this differential function tell us?

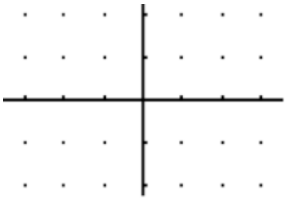
$\frac{dy}{dx} = 2x$

How can we represent what we learn from the equation graphically?

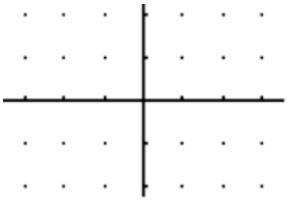


Draw a slope field for each differential equation.

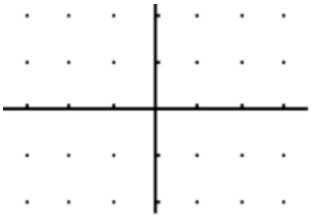
1. $\frac{dy}{dx} = x + 1$



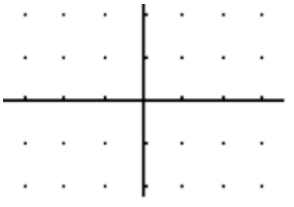
2. $\frac{dy}{dx} = \frac{x}{y}$



3. $\frac{dy}{dx} = x + y$



4. $\frac{dy}{dx} = 2y$



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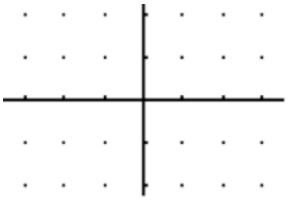
Draw a slope field and find the particular solution the differential equation.

5. $\frac{dy}{dx} = \frac{x^2}{y}; \quad f(3) = 1$



6. $\frac{dy}{dx} = \frac{-xy^2}{2}; \quad f(-1) = 2$

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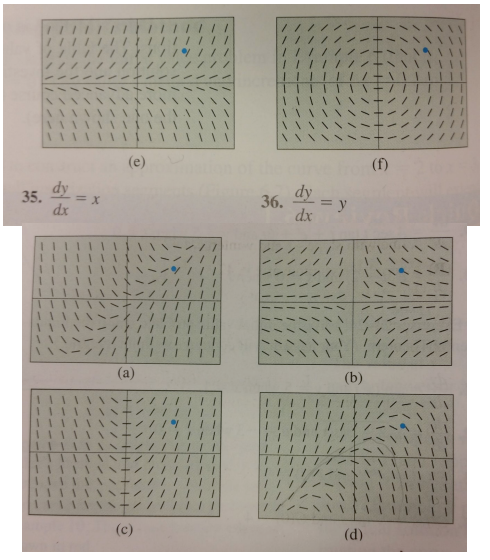

7. Write an equation that the slope field could represent.

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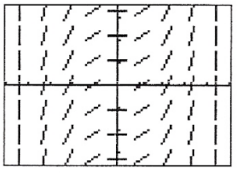

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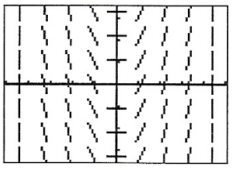

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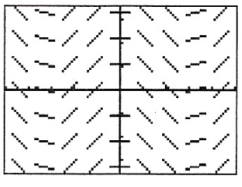

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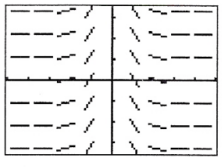

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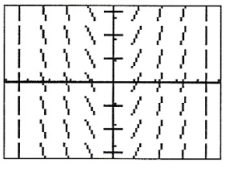

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