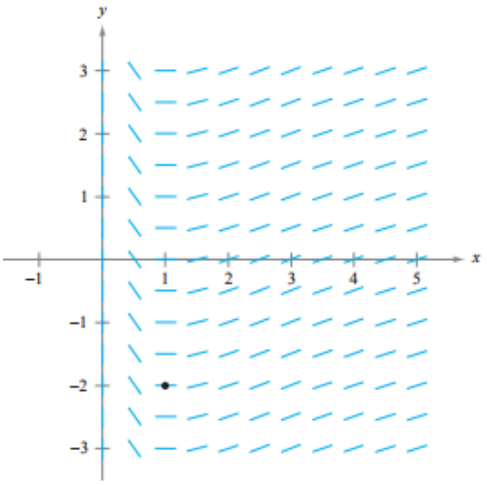
Some Practice Problems for Some Concepts in Unit 6

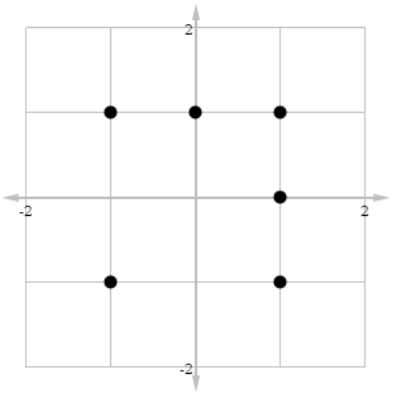
1. Using Euler's Method, approximate the particular solution to $y(0.3)$ of the differential equation $\frac{dy}{dx} = x + e^{-y}$ passing through $(0,1)$ using 3 increments of equal size.

2. Solve the differential equation $\frac{dy}{dx} = \frac{x}{y}\sin x$ for $y(0) = 4$.

3. Find and sketch the particular solution to $\frac{dy}{dx} = \frac{\ln x}{x}$ through the point $(1, -2)$.



4. Sketch a slope field for the differential equation, $\frac{dy}{dx} = 2x + y$ for the indicated 6 points.



5. Match the differential equation to the appropriate slope field. (Don't forget to justify your answers)

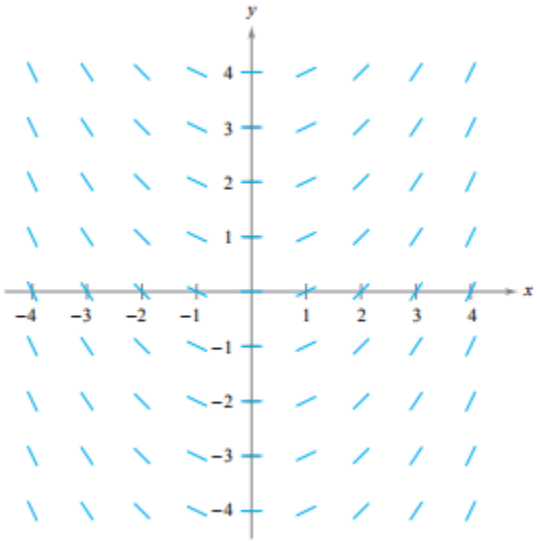
(1) $\frac{dy}{dx} = x$

(2) $\frac{dy}{dx} = -\frac{x}{y}$

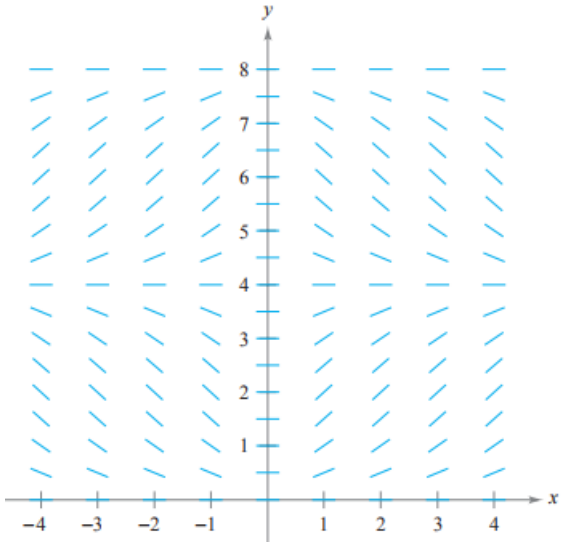
(3) $\frac{dy}{dx} = 4 - y$

(4) $\frac{dy}{dx} = 0.25x(4 - y)$

A.



B.



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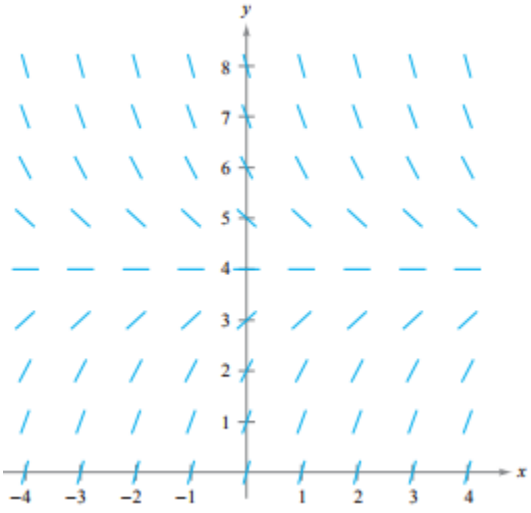
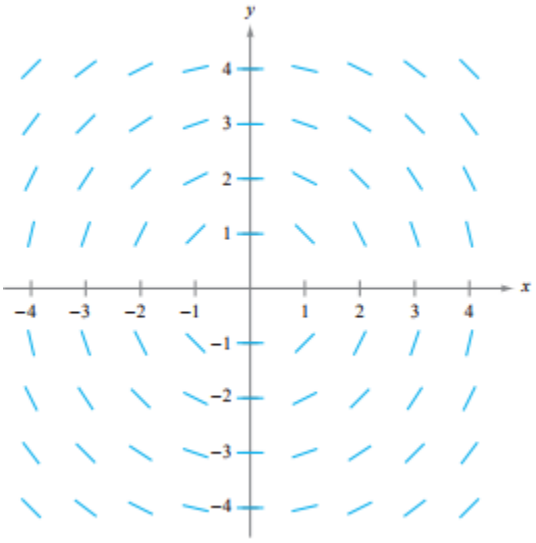


D.



6. Consider the differential equation $\frac{dy}{dx} = 3x + 2y + 1$. Let $y = f(x)$ be a particular solution to the differential equation with the initial condition $g(0) = k$, where k is a constant. Euler's method, starting at $x = 0$ with a step size of 1, gives the approximation $g(2) \approx 0$. Find the value of k.