

Skill Builder: Topic 7.3 – Sketching Slope Fields
Topic 7.4 – Reasoning Using Slope Fields

Sketch a slope field for each of the following differential equations.

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

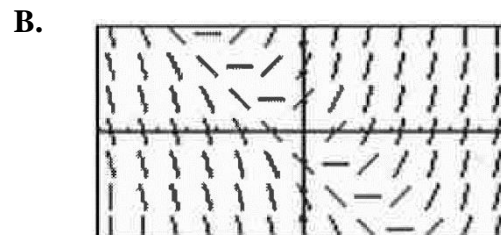
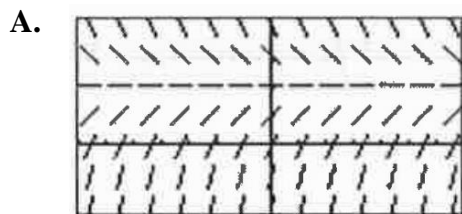
2. $\frac{dy}{dx} = 2y$

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

4. $\frac{dy}{dx} = \frac{-y}{x}$

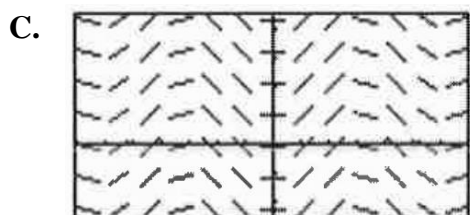
Match each slope field with their differential equation.

___ **C** ___ 5. $\frac{dy}{dx} = \sin x$



___ **D** ___ 6. $\frac{dy}{dx} = x - y$

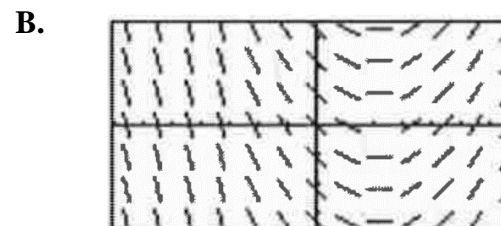
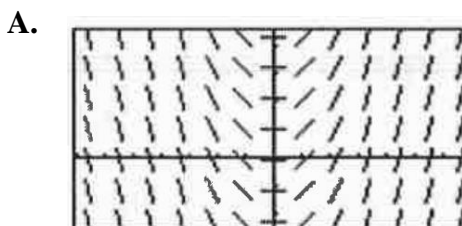
___ **A** ___ 7. $\frac{dy}{dx} = 2 - y$



___ **B** ___ 8. $\frac{dy}{dx} = x + y$

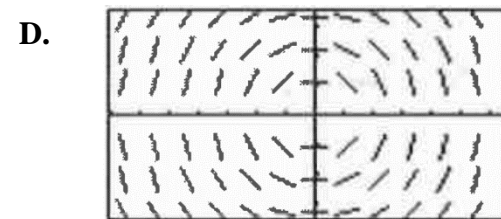
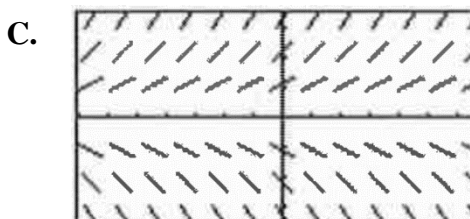
Match each slope field with their differential equation.

___ **B** ___ 9. $\frac{dy}{dx} = 0.5x - 1$



___ **C** ___ 10. $\frac{dy}{dx} = 0.5y$

___ **D** ___ 11. $\frac{dy}{dx} = -\frac{x}{y}$



___ **A** ___ 12. $\frac{dy}{dx} = x$

13. The slope field from a certain differential equation is shown to the right. Which of the following could be a specific solution to that differential equation?

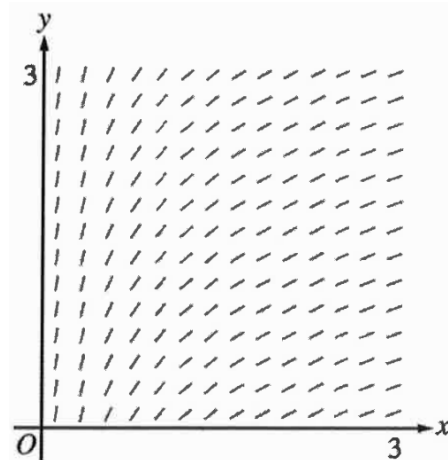
(A) $y = x^2$

(B) $y = e^x$

(C) $y = e^{-x}$

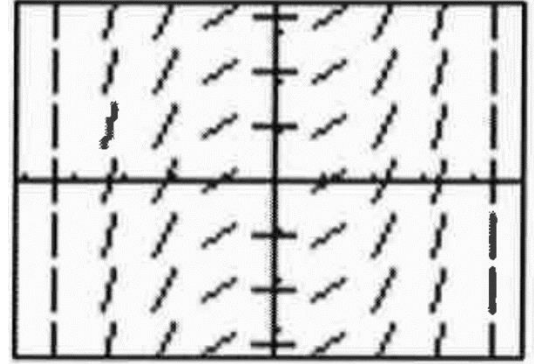
(D) $y = \cos x$

(E) $y = \ln x$



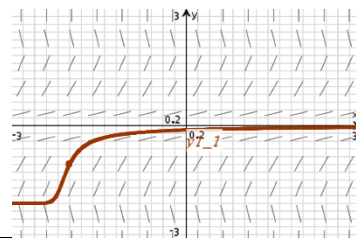
14. The slope field from a certain differential equation is shown to the right. Which of the following could be a specific solution to that differential equation?

- (A) $y = \sin x$ (B) $y = \cos x$ (C) $y = x^2$
(D) $y = \frac{1}{6}x^3$ (E) $y = \ln x$

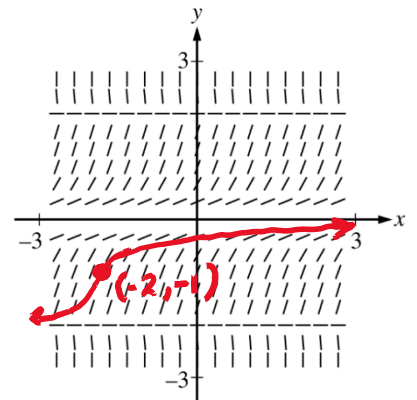


15. Shown to the right is a slope field for the differential equation $\frac{dy}{dx} = y^2(4 - y^2)$. If $y = g(x)$ is the solution to the differential equation with the initial condition $g(-2) = -1$, then $\lim_{x \rightarrow \infty} g(x)$ is

- (A) $-\infty$ (B) -2 **(C) 0** (D) 2 (E) 3

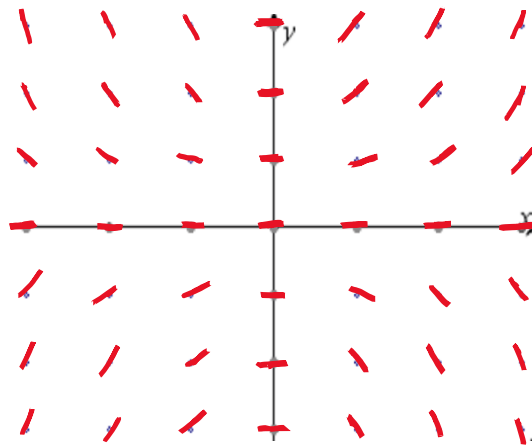


Screenshot from TI-Nspire



16. Consider the differential equation $\frac{dy}{dx} = \frac{xy}{2}$.

- a. On the axes provided, sketch a slope field for the given differential equation.

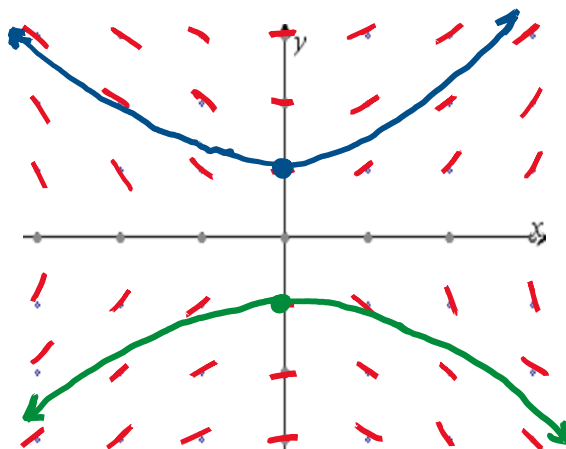


- b. Let f be the function that satisfies the given differential equation. Write an equation for the tangent line to the curve $y = f(x)$ that passes through the point $(1, 1)$. Then use your tangent equation to estimate the value of $f(1.2)$.

$$\left. \frac{dy}{dx} \right|_{(1,1)} = \frac{(1)(1)}{2} = \frac{1}{2} \quad y - 1 = \frac{1}{2}(x - 1) \quad f(1.2) \approx y(1.2) = 1 + \frac{1}{2}(1.2 - 1) = 1 + \frac{1}{2}\left(\frac{1}{5}\right) = 1 + \frac{1}{10} \text{ or } 1.1$$

17. Consider the differential equation $\frac{dy}{dx} = \frac{x}{y}$.

a. On the axes provided, sketch a slope field for the given differential equation.



b. Use a blue pen to sketch a solution curve that passes through the point $(0, 1)$ on your slope field.

c. Use a pen color other than blue to sketch a solution curve that passes through the point $(0, -1)$ on your slope field.

Screenshot from TI-Nspire

