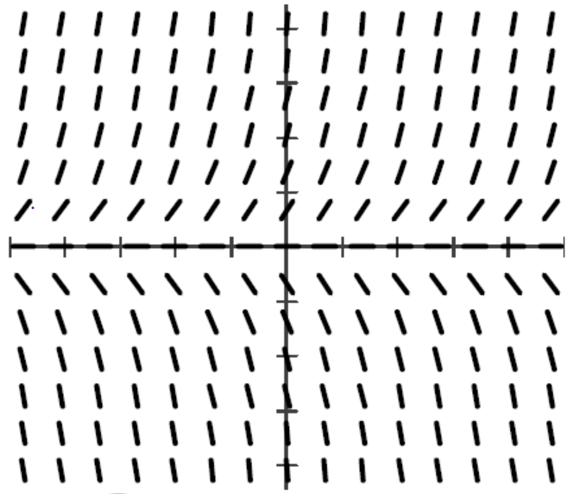
AP Calculus AB **Name:**
7.1 day 2 HW

1. The slope field for a differential equation is shown at the right. Which statement is true for solutions of the differential equation?

I. For $x < 0$ all solutions are decreasing.
II. All solutions level off near the x-axis.
III. For $y > 0$ all solutions are increasing.



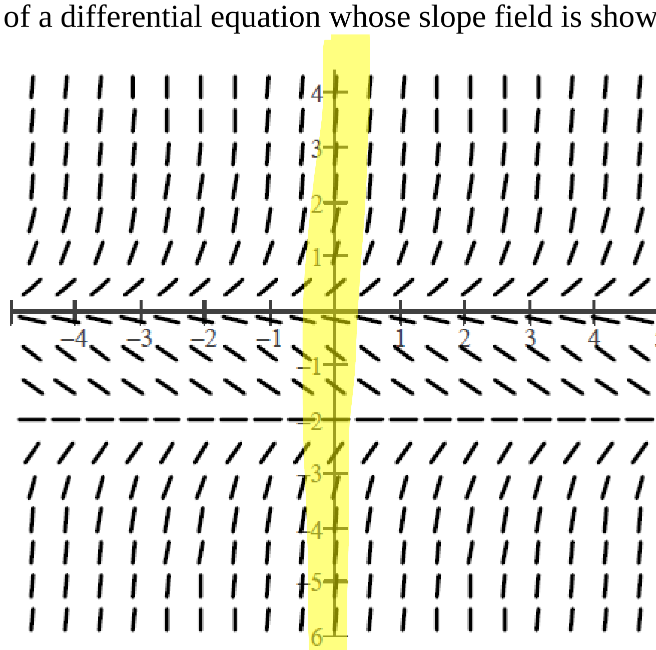
A. I only B. II only C. III only D. II and III only E. I, II, III

2. The slope field for the differential equation $\frac{dy}{dx} = \frac{x^2y + y^2}{4x + 2y}$ will have vertical segments when

A. $y = 2x$ only
B. $y = -2x$ only
C. $y = -x^2$ only
D. $y = 0$ only
E. $y = 0$ or $y = -x^2$

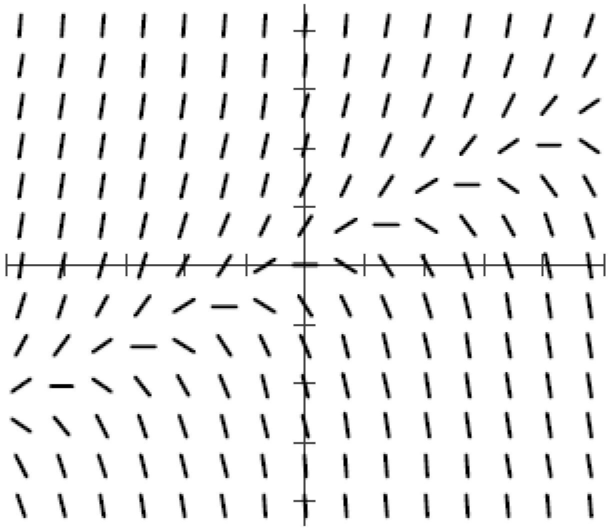
3. Which statement is true about the solutions $y(x)$, of a differential equation whose slope field is shown at right?

I. If $y(0) > 0$, then $\lim_{x\to\infty} y(x) \approx 0$
II. If $-2 < y(0) < 0$, then $\lim_{x\to\infty} y(x) \approx -2$
III. If $y(0) < -2$, then $\lim_{x\to\infty} y(x) \approx -2$



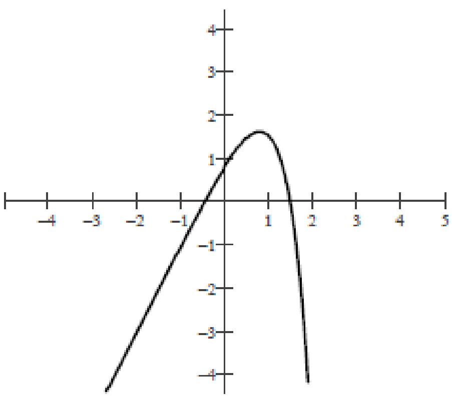
A. I only B. II only C. III only D. II and III only E. I, II, III

4.

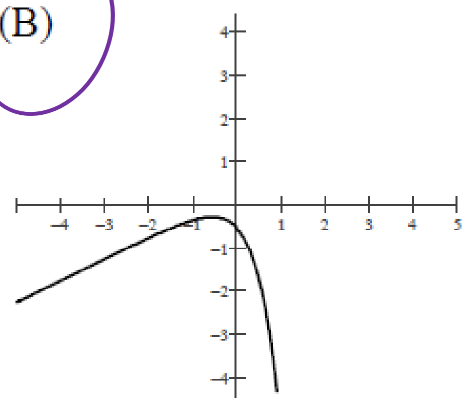


Which one of the following could be the graph of the solution of the differential equation whose slope field is above?

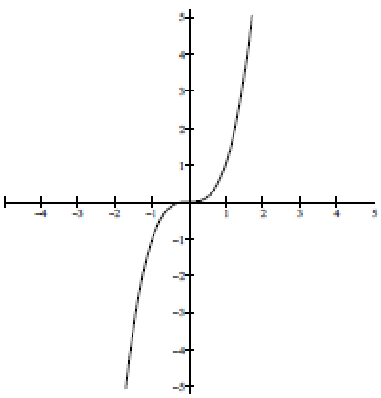
(A)



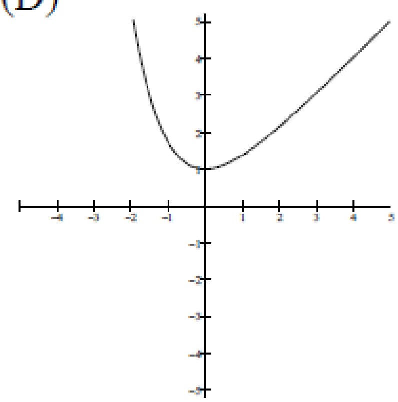
(B)



(C)



(D)



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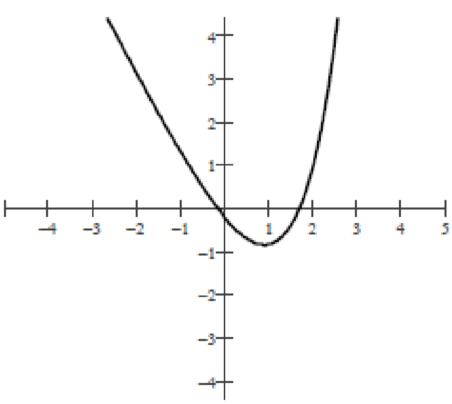
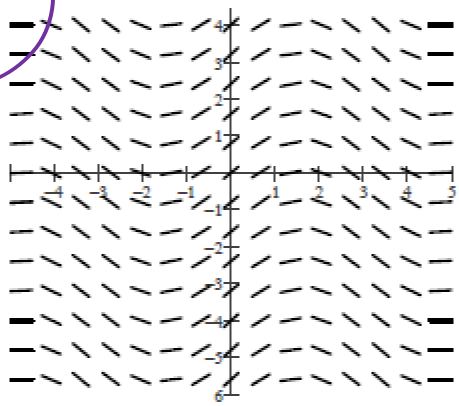


5. Which choice represents the slope field for $\frac{dy}{dx} = \cos x$?

(A)



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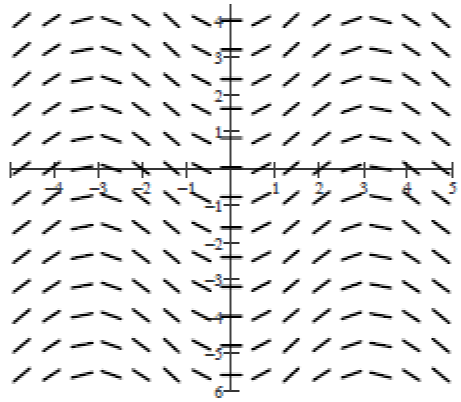
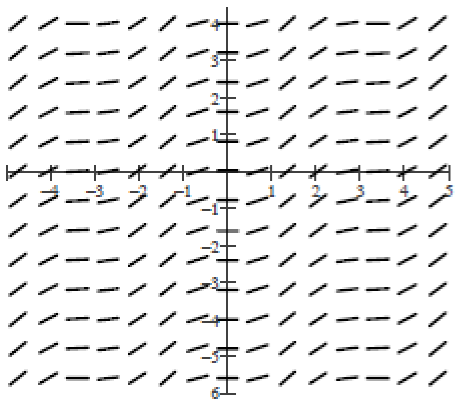
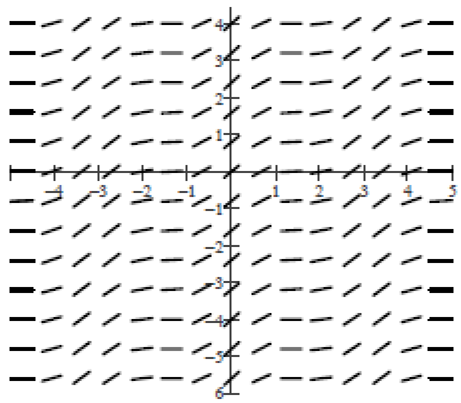


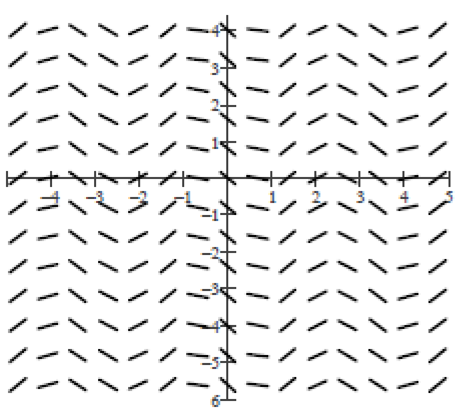
(C)



(D)



(E)



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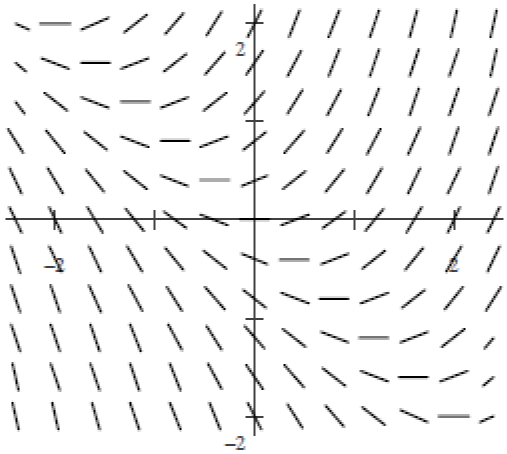
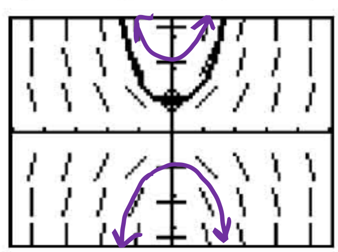


Shown above is the slope field for which of the following differential equations?

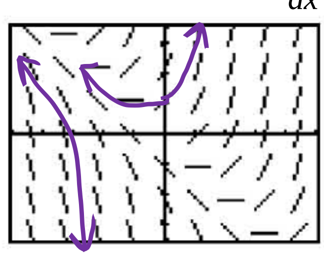
A. $\frac{dy}{dx} = 1 + x$ B. $\frac{dy}{dx} = x^2$ C. $\frac{dy}{dx} = x + y$ D. $\frac{dy}{dx} = \frac{x}{y}$ E. $\frac{dy}{dx} = \ln y$

7. The calculator drawn slope field for the differential equation $\frac{dy}{dx} = xy$ is shown in the figure below. The solution curve passing through the point (0,1) is also shown.



A. Sketch the solution curve through the point (0,2).
B. Sketch the solution curve through the point (0, -1).

8. The calculator drawn slope field for the differential equation $\frac{dy}{dx} = x + y$ is shown in the figure below.

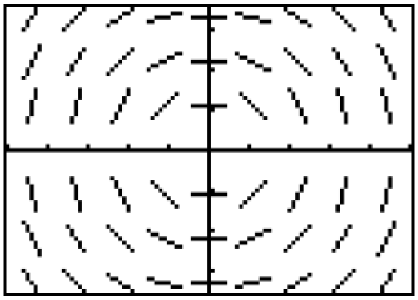


A. Sketch the solution curve through the point (0,1).
B. Sketch the solution curve through the point (-3,0).

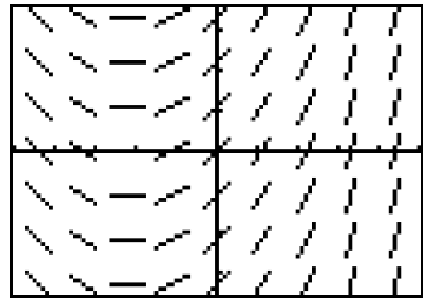
9.

Match the slope fields with their differential equations.

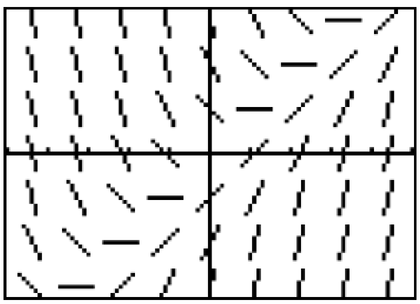
(A)



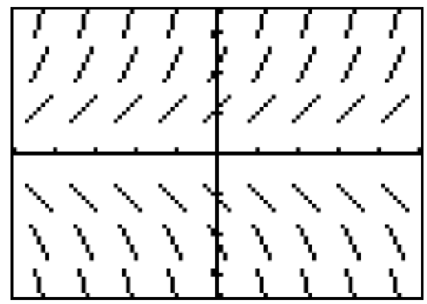
(B)



(C)



(D)



$\frac{dy}{dx} = \frac{1}{2}x + 1$ B

$\frac{dy}{dx} = x - y$ C

$\frac{dy}{dx} = y$ D

$\frac{dy}{dx} = -\frac{x}{y}$ A

10. If $f'(x) = 3x^2$ and $f(1) = 6$, find the particular solution to the differential equation.

$f(x) = x^3 + C$

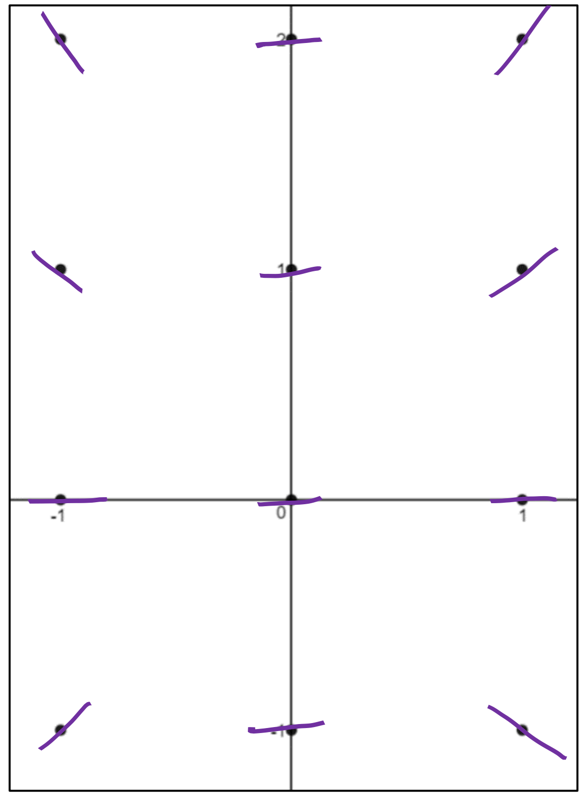
$6 = 1^3 + C$

$5 = C$

$f(x) = x^3 + 5$

11. Construct a slope field for $\frac{dy}{dx} = \frac{xy}{2}$.

x	y	$\frac{dy}{dx} = \frac{xy}{2}$
-1	2	-1
-1	1	-0.5
-1	0	0
-1	-1	0.5
0	2	0
0	1	0
0	0	0
0	-1	0
1	2	1
1	1	0.5
1	0	0
1	-1	-0.5



12. Suppose that $a(t)$, the acceleration of a particle at time t, is given by $a(t) = 4t - 3$, that $v(1) = 6$, and that $s(2) = 5$, where $s(t)$ is the position function and $v(t)$ is the velocity function.

(a) Find $v(t)$ and $s(t)$.

$v(t) = 2t^2 - 3t + C_1$

$6 = 2 - 3 + C_1$

$7 = C_1$

$v(t) = 2t^2 - 3t + 7$

$s(t) = \frac{2t^3}{3} - \frac{3t^2}{2} + 7t + C_2$

$5 = \frac{2 \cdot 8}{3} - \frac{3 \cdot 4}{2} + 7 \cdot 2 + C_2$

$C_2 = -\frac{25}{3}$

$s(t) = \frac{2t^3}{3} - \frac{3t^2}{2} + 7t - \frac{25}{3}$

(b) Find the position of the particle when $t = 1$.

$s(1) = \frac{2}{3} - \frac{3}{2} + 7 - \frac{25}{3} = -\frac{13}{6}$