

Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve the differential equation  $\frac{dy}{y} = \frac{-dx}{x}$ .

a)  $xy = C$                       b)  $xy^2 = C$

c)  $x^2y + y = C$                 d)  $x^2y = C$

e)  $y^2 + \frac{2}{x} = C$

2. Find the equation of the curve  $\frac{dy}{dx} = 12x^2 + 4x$  that passes through the point  $(-1, -5)$ .

a)  $y = 4x^2 + 2x - 3$             b)  $y = 12x^2 + 4x - 3$

c)  $y = 2x^3 - x^2$                 d)  $y = 4x^3 + 2x^2 - 3$

e)  $y = 4x^3 - 2x^2 - 5$

3. Let  $\frac{dy}{dx} = \cos x$ . Find the equation of the curve that passes through the point  $(\frac{\pi}{2}, 5)$ .

a)  $f(x) = \cos x + 5$             b)  $f(x) = \sin x$

c)  $f(x) = \sin x + 1$             d)  $f(x) = \sin x + 4$

e)  $f(x) = \cos x + 4$

4. Given  $\frac{dy}{dx} = \frac{3x^2}{x^3 + 5}$ , what is the equation of the curve that passes through the point  $(0, 0)$ ?

a)  $f(x) = \ln(x^3 + 5) - 1$

b)  $f(x) = \ln x^3 - 5$

c)  $f(x) = \ln(x^3 + 5) + \ln(5)$

d)  $f(x) = 5 \ln x^3 + \ln(5)$

e)  $f(x) = \ln(x^3 + 5) - \ln(5)$

5. Solve the differential equation  $\frac{1}{x} \frac{dy}{dx} = e^y$ , if  $y(0) = 1$ .

a)  $y = -\ln\left(\frac{2 - ex^2}{2e}\right)$

b)  $y = \ln\left(\frac{3 - x^2}{2e}\right)$

c)  $y = \ln\left(\frac{2 + x^2}{2e}\right)$

d)  $y = \ln\left(\frac{2 + x^2}{e}\right)$

e)  $y = \ln\left(\frac{3 + x^2}{e}\right)$

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6. Solve the differential equation  $\frac{2}{x} \frac{dy}{dx} = e^{2y}$ , if  $y(0) = -1$ .

a)  $y = \frac{1}{2} \ln \left( \frac{2}{2e^2 - x^2} \right)$

b)  $y = 2 \ln \left( \frac{2}{2e^2 - x^2} \right)$

c)  $y = -\frac{1}{2} \ln \left( \frac{2}{2e^2 - x^2} \right)$

d)  $y = \frac{1}{2} \ln \left( \frac{2e^2 - x^2}{2} \right)$

e)  $y = -2 \ln \left( \frac{2}{2e^2 - x^2} \right)$

7. Find the solution of the differential equation  $xy' = y - 2$  for  $y > 2$  and  $x > 0$ , given that the point  $(3, 8)$  is on the curve.

a)  $y = x + 2$     b)  $y = 2x + 2$     c)  $y = 5x - 2$

d)  $y = 2x - 2$     e)  $y = x - 1$

8. Find the solution of the differential equation  $2xy' = y + 5$  for  $y > -5$  and  $x > 0$ , given that the point  $(9, 7)$  is on the curve.

a)  $y = x - 5$

b)  $y = 4\sqrt{x} - 5$

c)  $y = 2\sqrt{x} + 5$

d)  $y = 4x - 5$

e)  $y = \sqrt{x} - 5$

9. Solve  $yy' = xe^{x^2}$ , for  $x \geq 1$ ,  $y \geq 1$ , and  $y(1) = 0$ .

a)  $y = \sqrt{e^{x^2} - e}$

b)  $y = \sqrt{e^{x^2}(x^2)}$

c)  $y = e^{x^2}(x^2 - 1)$

d)  $y = \sqrt{e^{x^2} - 1}$

e)  $y = \sqrt{e^{x^2}(x^2 - 2)}$

10. Solve  $yy' = 8xe^{2x^2}$ , for  $x \geq 1$ ,  $y \geq 1$ , and  $y(0) = 1$ .

a)  $y = \sqrt{4e^{2x^2} - 4}$

b)  $y = \sqrt{e^{x^2}(x^2)}$

c)  $y = 4e^{x^2}(2x^2 - 3)$

d)  $y = \sqrt{4e^{2x^2} - 3e}$

e)  $y = \sqrt{4e^{x^2}(x^2 - 3)}$

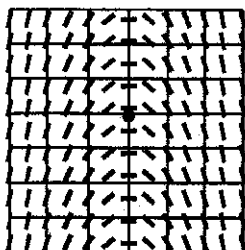
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11. Solve the differential equation  $y'e^x - y' = ye^x$ , given  $x \geq 2$ ,  $y \geq 2$ , and  $y(3) = 2$ .

- a)  $\frac{2(e^x + 1)}{e^3 - 1}$     b)  $\frac{2(e^x - 1)}{e^3 + 1}$     c)  $\frac{2(e^x - 1)}{e^3 - 1}$   
 d)  $\frac{4(e^x - 1)}{e^3 - 1}$     e)  $\frac{2(e^x - 1)}{e^2 - 1}$

12.

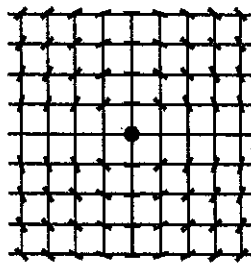


$[-3, 3] \times [-4, -3]$

Which of the following differential equations goes with the slope field shown?

- a)  $y' = -x$     b)  $y' = -x^2$     c)  $y' = -2x$   
 d)  $y' = 2x$     e)  $y' = x^2$

13.

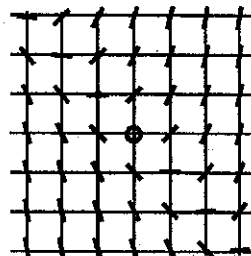


$[-4, 4] \times [-4, 4]$

The slope field shown matches which of the following differential equations?

- a)  $y' = x^2 - y^2$     b)  $y' = x + y$   
 c)  $y' = x^2 + y^2$     d)  $y' = \frac{x}{y}$   
 e)  $y' = -\frac{x}{y}$

14.



$[-3, 3] \times [-3, 3]$

Which of the following differential equations goes with the slope field shown?

- a)  $y' = x - y$     b)  $y' = x + y$   
 c)  $y' = x^2 + y^2$     d)  $y' = \frac{x}{y}$   
 e)  $y' = -\frac{x}{y}$

