(59) $\frac{dy}{dx} = 5$

$\int dy = \int 5\,dx$

$y = 5x + c$

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

$\int dy = \int 2x\,dx$

$y = x^2$

$x = y^2$

$y = \pm\sqrt{x}$

$\frac{dy}{dx} = \frac{1}{2}x^{-1/2}$

(63) $\frac{dy}{dx} = 2xy$

(0,1)

$\int \frac{dy}{y} = \int 2x\,dx$

$\ln y = x^2 + c$

$\ln 1 = 0 + c$

$0 = c$

$\ln y = x^2$

$e^{x^2} = y$

Jan 8-10:09 AM

Opener

If $\frac{dy}{dx} = 2y^2$ and if $y = -1$ when $x = 1$, then when $x = 2$, $y =$

(A) $-\frac{2}{3}$ (B) $-\frac{1}{3}$ (C) 0 (D) $\frac{1}{3}$ (E) $\frac{2}{3}$

$\int \frac{dy}{y^2} = \int 2\,dx$ $\quad y^{-2}dy$

$-y^{-1} = -\frac{1}{y} = 2x + c$

$\frac{-1}{-1} = 2 + c$

$1 = 2 + c$

$-1 = c$

$-\frac{1}{y} = 2x - 1$

$-\frac{1}{y} = \frac{3}{1}$

$3y = -1$

$y = -\frac{1}{3}$

Dec 11-6:55 PM

6-1 Day 3 Differential Equations and Slope Fields

Learning Objectives:

I can graph and interpret a slope field for a given differential equation

Dec 7-11:20 AM

Ex1. Solve $\frac{dy}{dx} = -\frac{x}{y}$

$\int y\,dy = \int -x\,dx$

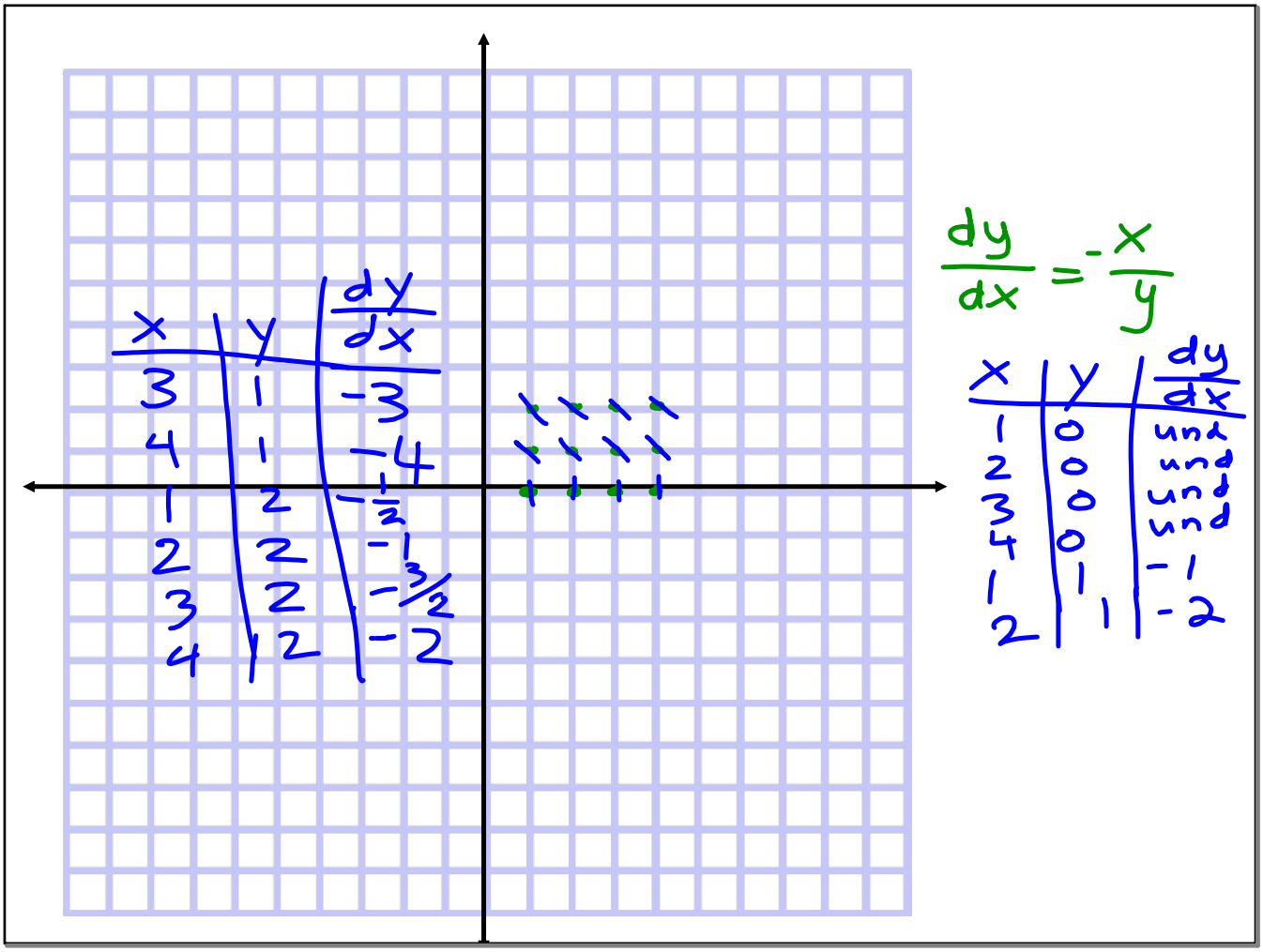
$\frac{1}{2}y^2 = -\frac{1}{2}x^2 + C$

$y^2 = -x^2 + C$

$y = \pm\sqrt{-x^2 + C}$

$(x^2 + y^2 = C)$

Dec 7-11:20 AM


dy/dx = -x/y
x | y | dy/dx
3 | 1 | -3
4 | 1 | -4
1 | 2 | -1/2
2 | 2 | -1
3 | 2 | -3/2
4 | 2 | -2
x | y | dy/dx
1 | 0 | und
2 | 0 | und
3 | 0 | und
4 | 0 | und
1 | 1 | -1
2 | 1 | -2

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Ex2. Solve $\frac{dy}{dx} = x + y$

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

$-y\,dx + dy = x\,dx$

cannot be solved

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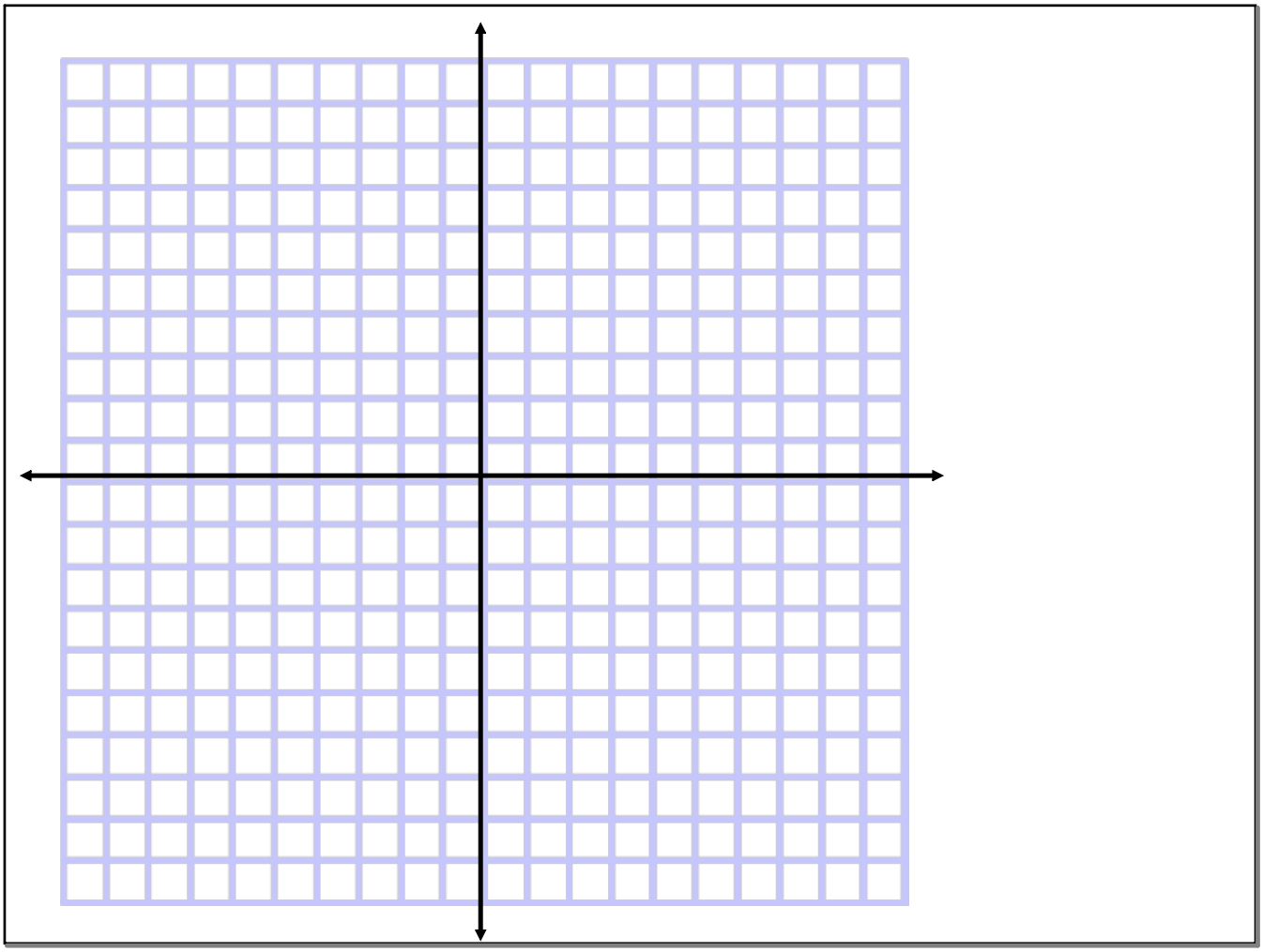
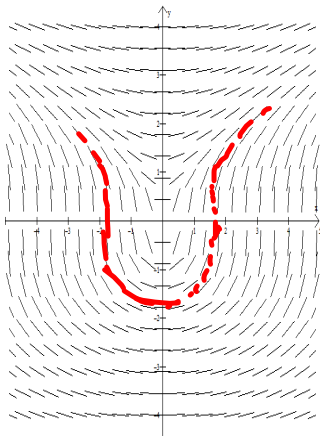


Jan 8-9:57 PM

Ex3. Sketch the slope field for the given differential equation. Then solve the differential equation

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



$$\int y^2\,dy = \int x\,dx$$

$$\frac{1}{3}y^3 = \frac{1}{2}x^2 + C$$

$$y^3 = \frac{3}{2}x^2 + C$$

$$y = \sqrt[3]{\frac{3}{2}x^2 + C}$$

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Ex4. Solve the differential equation

$\frac{dy}{dx} = yx$ initial condition (0,2)

$\int \frac{dy}{y} = \int x\,dx$

$\ln y = \frac{1}{2}x^2 + C$

$\ln 2 = C$

$e^{\frac{1}{2}x^2 + C} = y$

$\ln y = \frac{1}{2}x^2 + \ln 2$

$y = e^{\frac{1}{2}x^2 + \ln 2}$

$y = e^{\frac{1}{2}x^2} e^{\ln 2}$

$y = 2e^{\frac{1}{2}x^2}$

Homework

pg 328 #29-40, 49, 50, 55, 57, 58, 61, 62, 64

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