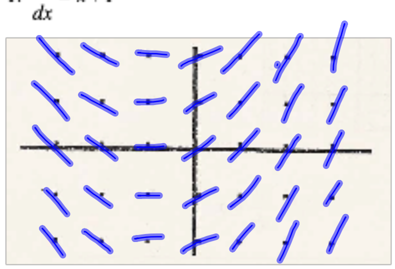
6.1 Slope Fields day 2

Draw a slope field for each of the following differential equations. Each tick mark is one unit.

$\int(x+1) = \frac{x^2}{2}+x+c$

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



$m=0$, when $x=-1$

$m=1$, when $x=0$

$m=2$, when $x=1$

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

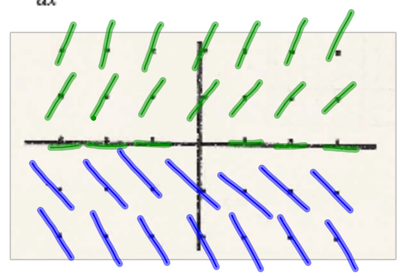
$\frac{dy}{dx}=0$

$m=0$ when $y=0$

$m=2$ when $y=1$

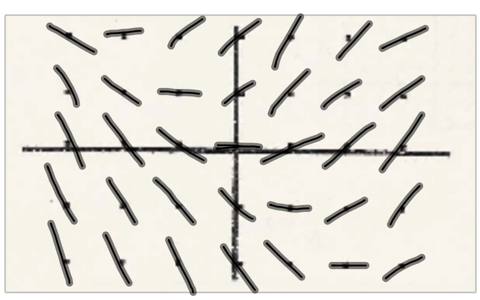
$m=4$ when $y=2$

$m=-2$ when $y=-1$

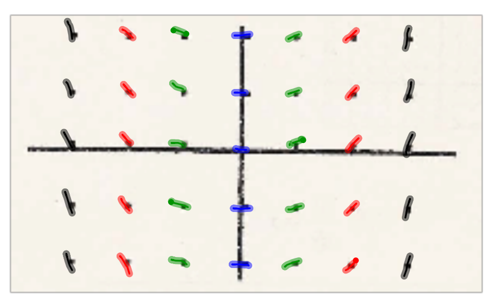


$m=0$

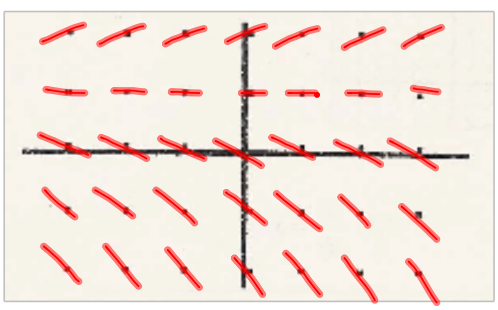
3. $\frac{dy}{dx} = x+y$



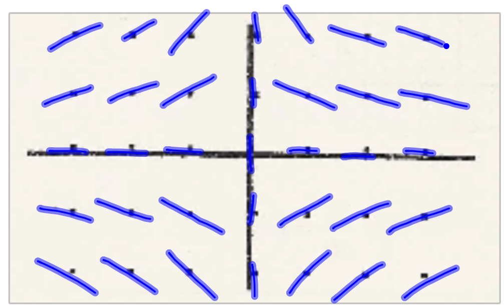
4. $\frac{dy}{dx} = 2x$



5. $\frac{dy}{dx} = y - 1$

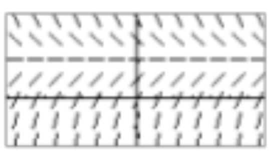


6. $\frac{dy}{dx} = -\frac{y}{x}$

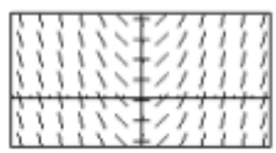


Match the slope fields with their differential equations.

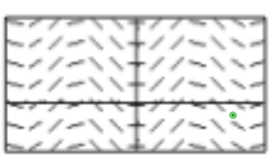
(A)



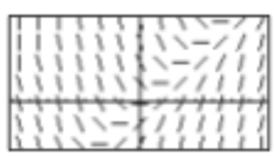
(B)



(C)



(D)



c

7. $\frac{dy}{dx} = \sin x$

d

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

a

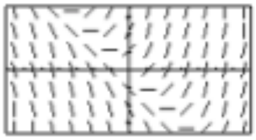
9. $\frac{dy}{dx} = 2 - y$

b

10. $\frac{dy}{dx} = x$

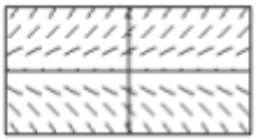
Match the slope fields with their differential equations.

(A)

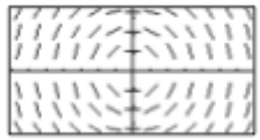


(B)

(C)



(D)



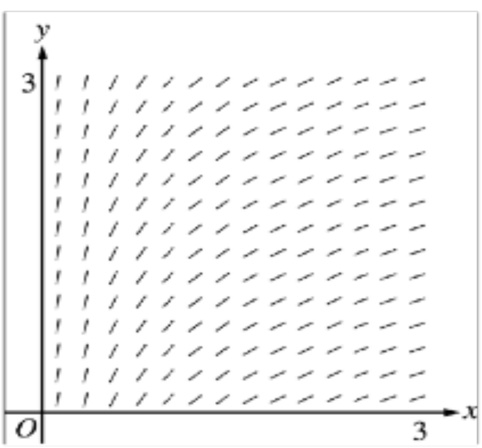
11. $\dfrac{dy}{dx} = 0.5x - 1$ B

12. $\dfrac{dy}{dx} = 0.5y$ C

13. $\dfrac{dy}{dx} = -\dfrac{x}{y}$ D

14. $\dfrac{dy}{dx} = x + y$ A

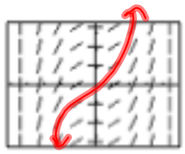
15.



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

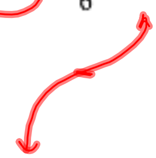
(A) $y = x^2$ (B) $y = e^x$ (C) $y = e^{-x}$ (D) $y = \cos x$ (E) $y = \ln x$

16.



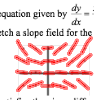
The slope field for a certain differential equation is shown above. Which of the following could be a specific solution to that differential equation?

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



17. Consider the differential equation given by $\frac{dy}{dx} = \frac{xy}{2}$.

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



estimate

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

$y = \frac{1}{2}(1.2) + \frac{1}{2} = \boxed{1.1}$

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

$m = \frac{1 \cdot 1}{2} = \frac{1}{2}$ $\boxed{y - 1 = \frac{1}{2}(x - 1)}$

(C) Find the particular solution $y = f(x)$ to the differential equation with the initial condition $f(1) = 1$. Use your solution to find $f(1.2)$.

(D) Compare your estimate of $f(1.2)$ found in part (b) to the actual value of $f(1.2)$ found in part

(E) Was your estimate from part (b) an underestimate or an overestimate? Use your slope field to explain why.

can't do yet. But it's an intro to "6.4"

$dx \cdot \frac{1}{y}\frac{dy}{dx} = \frac{x\cancel{y}}{2} \cdot \frac{1}{\cancel{y}} \cdot dx$

$\frac{1}{y}dy = \frac{x}{2}dx$

$\int \frac{1}{y}dy = \int \frac{x}{2} \cdot dx$

$\ln y = \frac{x^2}{4} + C \longrightarrow \ln y = \frac{x^2}{4} - \frac{1}{4}$

(1,1)

$\ln 1 = \frac{1^2}{4} + C$

$0 = \frac{1}{4} + C$

$-\frac{1}{4} = C$

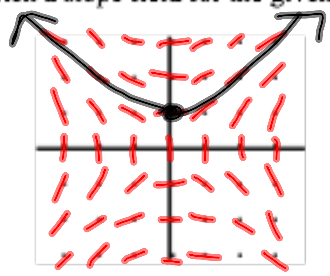
$\boxed{e^{\frac{x^2-1}{4}} = y}$

$e^{\left(\frac{1.2^2-1}{4}\right)} = y = 1.116$

The estimate was under the actual. For the estimate we used $m = \frac{1}{2}$ when $x=1, y=1$. When $x = 1.2$, the slope is more than a $\frac{1}{2}$ since the slope field shows $m = 1$ when $x=2, y=1$.

18. Consider the differential equation given by $\frac{dy}{dx} = \frac{x}{y}$.

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



in black

(B) Sketch a solution curve that passes through the point (0, 1) on your slope field.

~~(C) Find the particular solution $y = f(x)$ to the differential equation with the initial condition $f(0) = 1$.~~

~~(D) Sketch a solution curve that passes through the point $(0, -1)$ on your slope field.~~

~~(E) Find the particular solution $y = f(x)$ to the differential equation with the initial condition $f(0) = -1$.~~