WARM UP

1. $\int \sqrt{1-\cos^2 x}\,dx$

2. $\int \left(e^x + 3\right) dx$

3. If $\frac{dy}{dt} = -2y$ and if $y = 1$ when $t = 0$,
what is the value of t for which $y = \frac{1}{2}$?

(A) $-\frac{1}{2}\ln 2$ (B) $-\frac{1}{4}$ (C) $\frac{1}{2}\ln 2$ (D) $\frac{\sqrt{2}}{2}$ (E) $\ln 2$

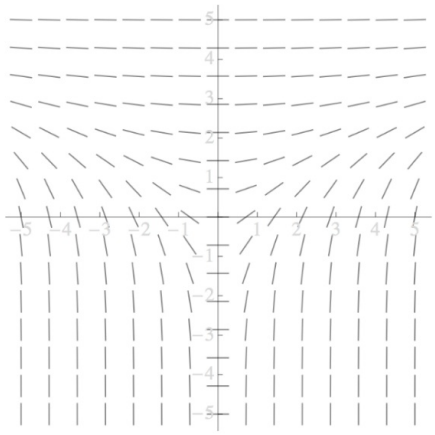
SLOPE FIELDS

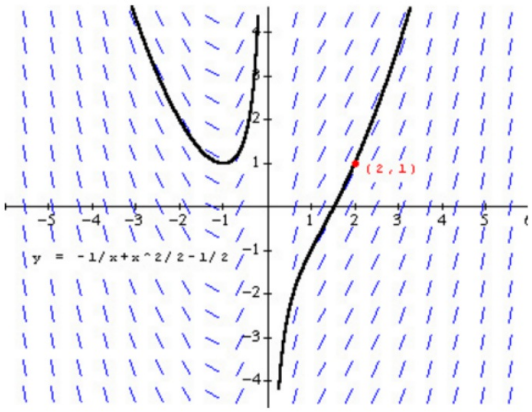
Objective:

- Given a differential equation, sketch a slope field to represent the slope at any point.
- Sketch a solution to a differential equation going through a point

Slope Fields - provide a way to visualize family of solutions of differential equations (family of antiderivaties).

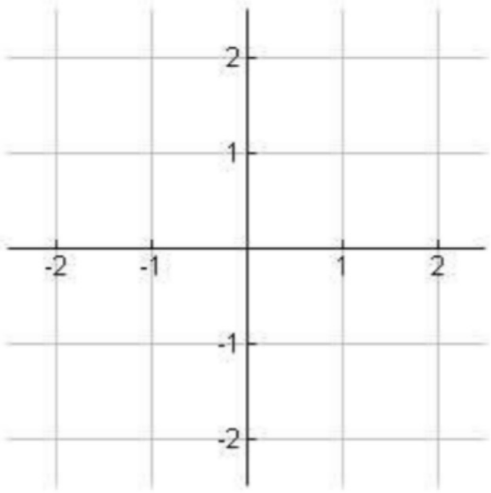
Each line segment has the same slope as the solution curve through that point.





Draw a slope field for the differential equation at the indicated points.

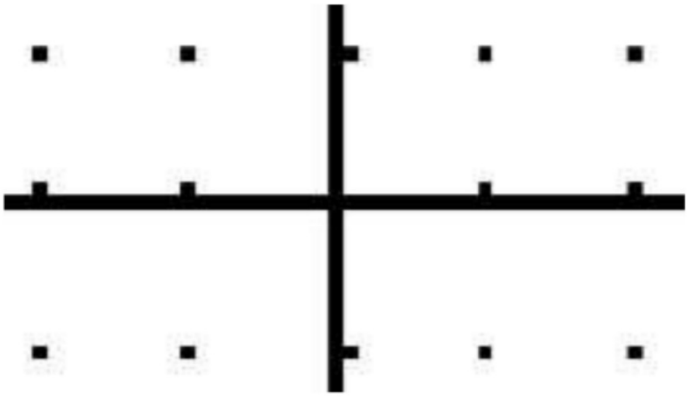
$$\frac{dy}{dx} = x^2$$



When drawing a slope field, be sure your slopes of 0, 1, -1, and undefined are perfect. The other slopes must be at a steepness relative to these.

Draw a slope field for the differential equation:

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



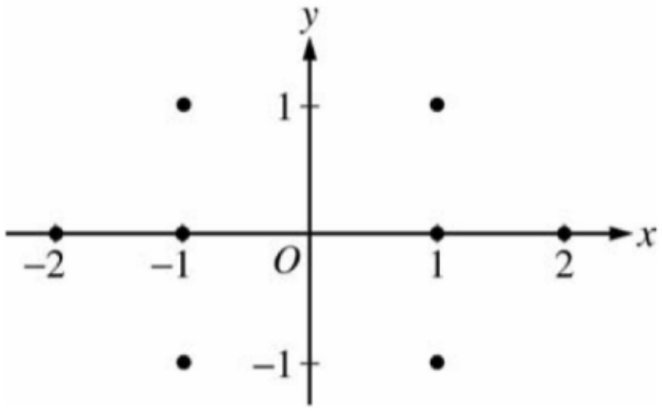
Sketch the graph of the solution with initial values (a) (1,1) and (b) (-2,-1).

When drawing a particular solution you must draw a continuous, functional curve making sure to pass through the given point.

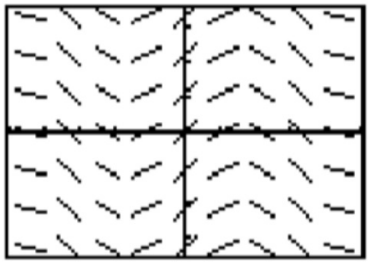
For $\frac{dy}{dx} = \frac{y+2}{x}$, where $x \neq 0$,

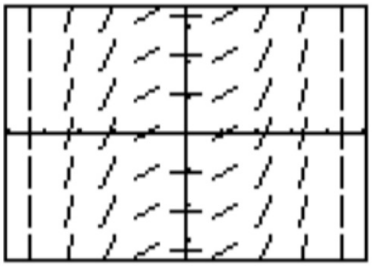
(a) On the axes provided, sketch a slope field for the given differential equation at the eight points indicated.

(b) Sketch the solution curve that passes through the point $(1,1)$.



Match each slope field with the equation of the general solution it could represent.



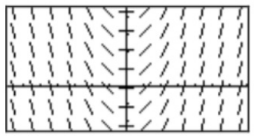


(A) $y = 1$ (B) $y = x$ (C) $y = x^2$ (D) $y = \frac{x^3}{6}$ (E) $y = \frac{1}{x^2}$ (F) $y = \sin x$

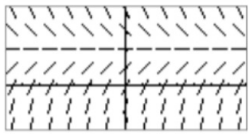
(G) $y = \cos x$ (H) $y = \ln|x|$

Match the slope fields with their differential equations.

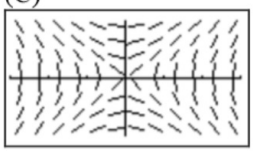
(A)



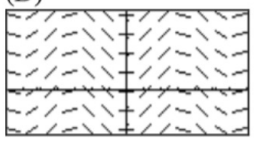
(B)



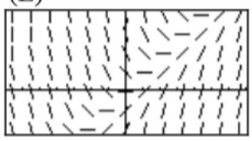
(C)



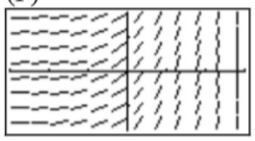
(D)



(E)



(F)



I. $\frac{dy}{dx} = e^x$ II. $\frac{dy}{dx} = \frac{x}{y}$ III. $\frac{dy}{dx} = 2 - y$ IV. $\frac{dy}{dx} = x$ V. $\frac{dy}{dx} = x - y$ VI. $\frac{dy}{dx} = \sin x$