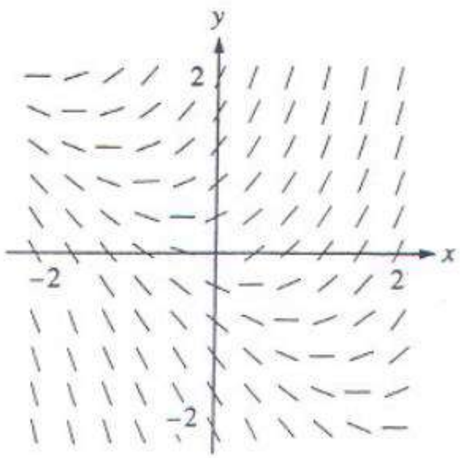
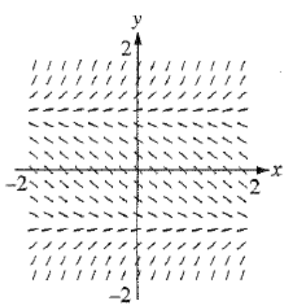


24. Shown above is a slope field for which of the following differential equations?

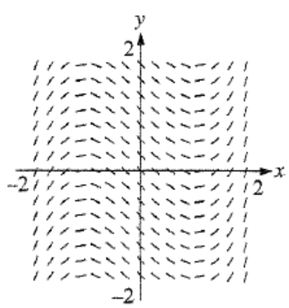
A) $\frac{dy}{dx} = 1 + x$ B) $\frac{dy}{dx} = x^2$ C) $\frac{dy}{dx} = x + y$ D) $\frac{dy}{dx} = \frac{x}{y}$ E) $\frac{dy}{dx} = \ln y$

27. Which of the following could be the slope field for the differential equation $\frac{dy}{dx} = y^2 - 1$

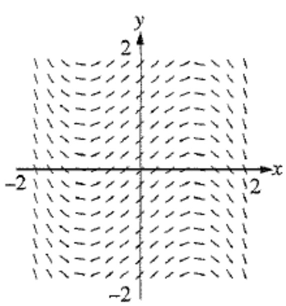
(A)



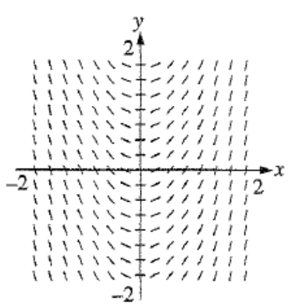
(B)



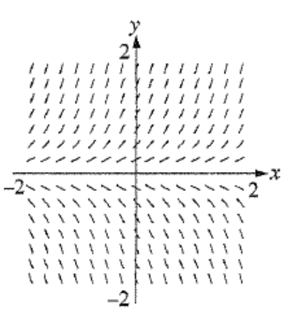
(C)

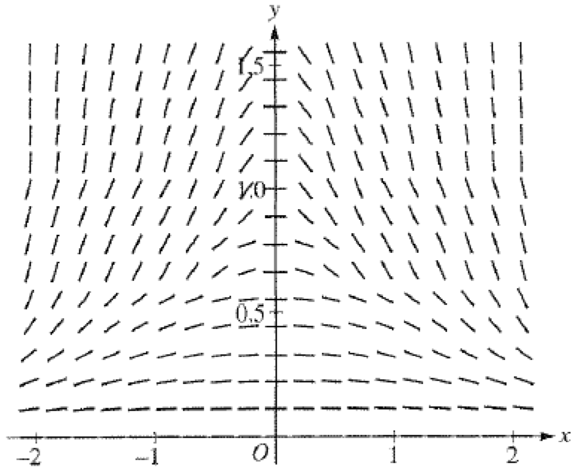


(D)



(E)

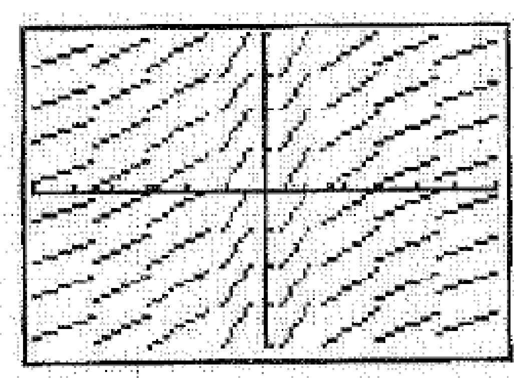




15. The slope field for a certain differential equation is shown above. Which of the following could be a solution to the differential equation with the initial condition y(0) = 1?

A) $y = \cos x$
B) $y = 1 - x^2$
C) $y = e^x$
D) $y = \sqrt{1-x^2}$
E) $y = \dfrac{1}{1+x^2}$

2. Indicate which differential equation is represented in the slope field graph.

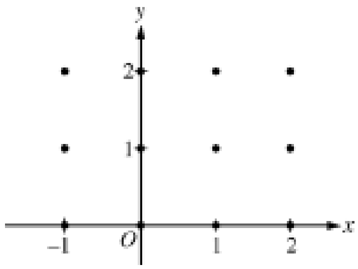


x: [−6, 6] y: [−4, 4]

A) $\dfrac{dy}{dx} = x^3$ B) $\dfrac{dy}{dx} = \sqrt[3]{x}$ C) $\dfrac{dy}{dx} = \tan^{-1} x$ D) $\dfrac{dy}{dx} = x^{\frac{-2}{3}}$ E) $\dfrac{dy}{dx} = x^{\frac{2}{3}}$

4. Consider the differential equation $\frac{dy}{dx} = 2x - y$.

a. On the axes provided, sketch a slopefield for the given differential equation at the twelve points indicated, and sketch the solution curve that passes through the point (0, 1)



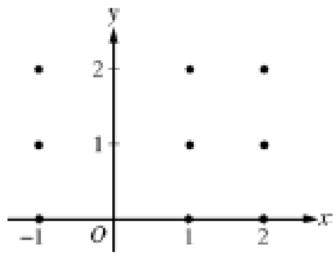
b. The solution curve that passes through the point (0, 1) has a local minimum at x = ln (1.5). What is the y-coordinate of this local minimum?

c. Let y = f(x) be the particular solution to the given differential equation with the initial condition f(0) = 1. Use Euler's method, starting at x = 0 with two steps of equal size, to approximate f(-.4). Show the work that leads to your answer.

d. Find $\frac{d^2y}{dx^2}$ in terms of x and y. Determine whether the approximation found in part (c) is an overestimate or underestimate. Justify your answer.

5. Consider the differential equation $\frac{dy}{dx} = \frac{y-1}{x^2}$, where $x \neq 0$.

a) On the axis provided, sketch a slope field for the given differential equation at the nine points indicated.

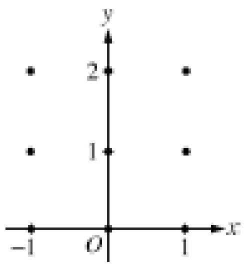


b) Find the particular solution y = f(x) to the differential equation with the initial condition f(2) = 0.

c) For the particular solution y = f(x) described in part (b), find $\lim_{x\to\infty} f(x)$.

5. Consider the differential equation $\frac{dy}{dx} = \frac{1}{2}x + y - 1$.

a) On the axis provided, sketch a slope field for the given differential equation at the nine points indicated

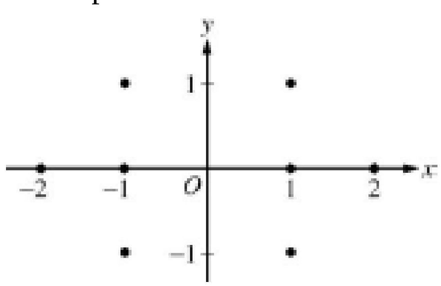


b) Find $\frac{d^2y}{dx^2}$ in terms of x and y. Describe the region in the xy plane in which all solution curves to the differential equation are concave up.

c) Let y = f(x) be a particular solution to the differential equation with the initial condition f(0) = 1. Does f have a relative minimum, a relative maximum, or neither at x = 0? Justify your answer.

5. Consider the differential equation $\frac{dy}{dx} = \frac{1+y}{x}$, where $x \neq 0$.

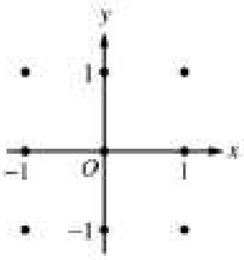
a) On the axis provided, sketch a slope field for the given differential equation at the eight points indicated



a) Find the particular solution y = f(x) to the differential equation with the initial condition f(-1) = 0 and state its domain.

5. Consider the differential equation $\frac{dy}{dx} = (y-1)^2 \cos(\pi x)$, where $x \neq 0$.

a) On the axis provided, sketch a slope field for the given differential equation at the nine points indicated

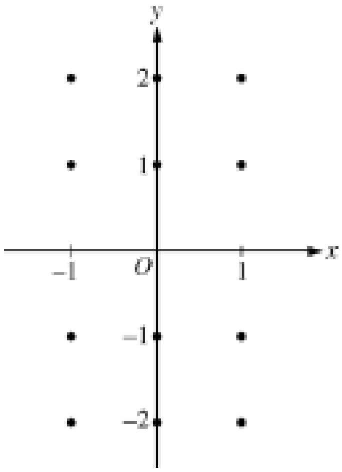


b) There is a horizontal line with equation y = c that satisfies this differential equation. Find the value of c

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

6. Consider the differential equation $\frac{dy}{dx} = \frac{-2x}{y}$, where $x \neq 0$.

a) On the axis provided, sketch a slope field for the given differential equation at the twelve points indicated

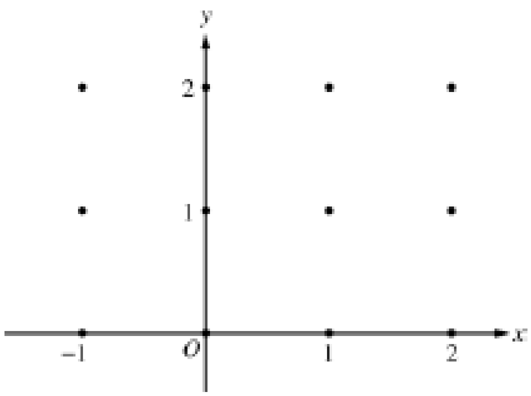


b) Let y = f(x) be the particular solution to the differential equation with initial condition f(1) = -1. Write an equation for the line tangent to the graph of f at (1, -1) and use it to approximate f(1.1).

c) Find the particular solution y = f(x) to the given differential equation with the initial condition f(1) = -1.

6. Consider the differential equation $\frac{dy}{dx} = \frac{-xy^2}{2}$. Let y = f(x) be the particular solution to this differential equation with the initial condition f(-1) = 2.

a) On the axis provided, sketch a slope field for the given differential equation at the twelve points indicated

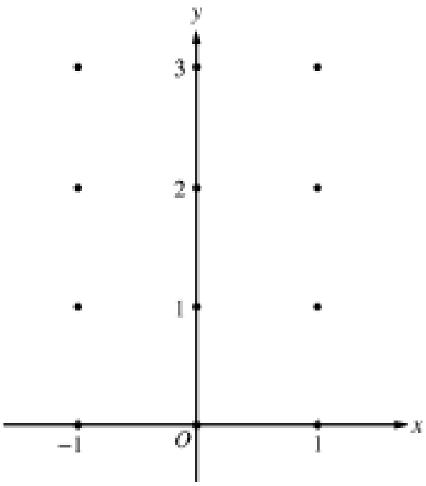


b) Write an equation for the tangent line to the graph of f at x = -1.

c) Find the solution y = f(x) to the given differential equation with the initial condition f(-1) = 2.

6. Consider the differential equation $\frac{dy}{dx} = \frac{-xy^2}{2}$.

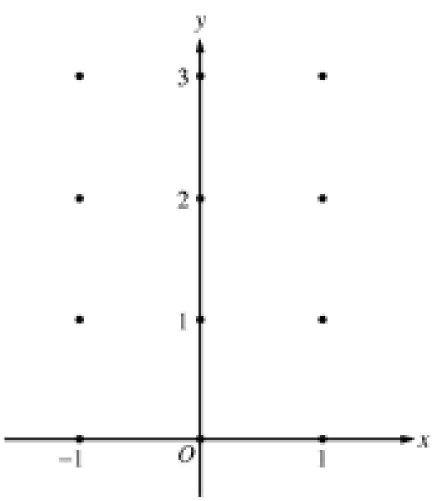
a) On the axis provided, sketch a slope field for the given differential equation at the twelve points indicated



b) Find the particular solution y = f(x) to the given differential equation with the initial condition f(0) = 3.

6. Consider the differential equation $\frac{dy}{dx} = x^4(y-2)$.

a) On the axis provided, sketch a slope field for the given differential equation at the twelve points indicated



b) Find the particular solution y = f(x) to the given differential equation with the initial condition f(0) = 0.