

1. Do WebAssign 11.1. Again, start with the WebAssign.

2. A quantity Q satisfies the differential equation

$$\frac{dQ}{dt} = \frac{t}{Q} - 0.5$$

If $Q = 8$ when $t = 2$, use dQ/dt to determine whether Q is increasing or decreasing at $t = 2$.

Use your work above to estimate the value of Q when $t = 3$. Assume the rate of change stays approximately constant over the interval from $t = 2$ to $t = 3$.

3. Show that $y = A + Ce^{kt}$ is a solution to the equation

$$\frac{dy}{dt} = k(y - A)$$

4. Suppose $Q = Ce^{kt}$ satisfies the differential equation

$$\frac{dQ}{dt} = -0.03Q$$

What (if anything) does this tell you about the values of C and k .

5. The height y of a hanging cable above the horizontal line satisfies

$$\frac{d^2y}{dx^2} = k\sqrt{1 + \left(\frac{dy}{dx}\right)^2}$$

Show that $y = (e^x + e^{-x})/2$ satisfies the equation if $k = 1$.

For general k , one solution to this differential equation is of the form

$$y = \frac{e^{Ax} + e^{-Ax}}{2A}$$

Substitute this expression for y into the differential equation to find A in terms of k .

Slope Fields

Understand	Know that slope fields are one way to visualize solutions to differential equations.
Understand	Correctly identify slope fields with their corresponding differential equations.
Apply	Use a slope field to qualitatively describe the behavior of the solutions of a differential equation.
Apply	Use a slope field to find an approximate solution to an initial value problem.

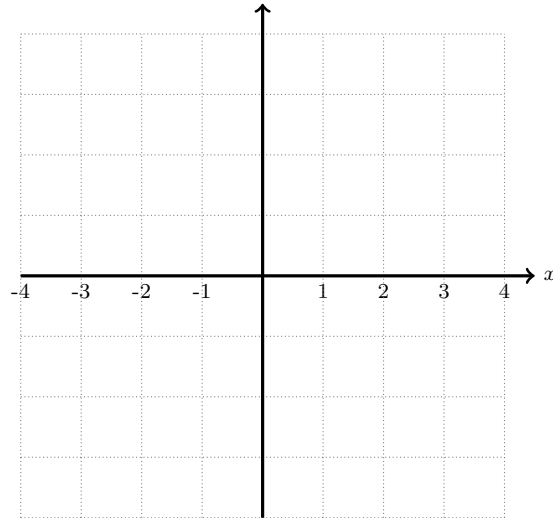
1. In the problem, we are going to plot the slope field for the differential equation $y' = x - y$.

At the point $(2,0)$, the differential equation shows that the derivative y' evaluates to $y' = 2 - 0$, indicating that the solution to the differential equation has positive slope. Use this fact to plot a short line segment of slope 2, $//$, at the point $(2,0)$.

At the point $(1,1)$, the differential equation shows that derivative y' evaluates to $y' = 1 - 1$, indicating that the solution to the differential equation has zero slope. Use this fact to plot a short, horizontal sloping line, $-$, at the point $(1,1)$.

Repeat this for all integer pairs on the grid.

Use the slope field to sketch the approximate solution to the initial value problem $y' = x - y$, for $y(0) = 1$.



Quiz (Leave this space blank)