

Warm-up Problems - February 27, 2006

Solutions

1. If C is a constant, find the derivative:

(a) $y = -3x + \frac{C}{x}$

Solution: $y' = -3 - \frac{C}{x^2}$

(b) $y = \frac{x}{2} - 1 + \frac{C}{x}$

Solution: $y' = \frac{1}{2} - \frac{C}{x^2}$

(c) $y = -1 + Cx$

Solution: $y' = C$

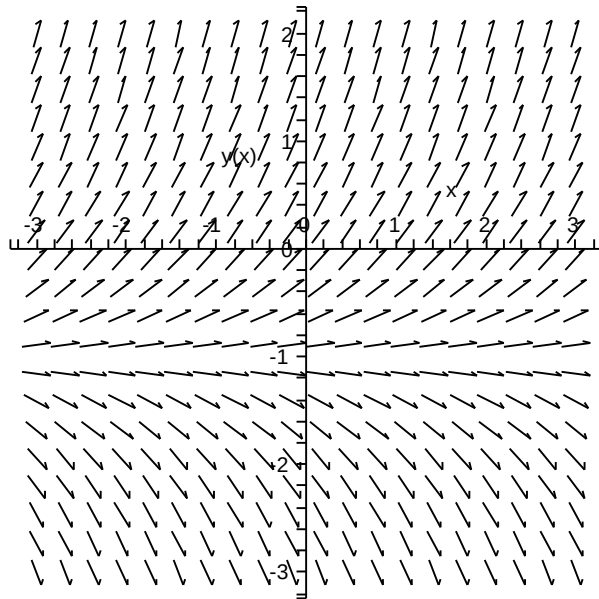
Lecture Problems

2. Draw the slope field for the differential equations

(a) $y' = y + 1$

Solution:

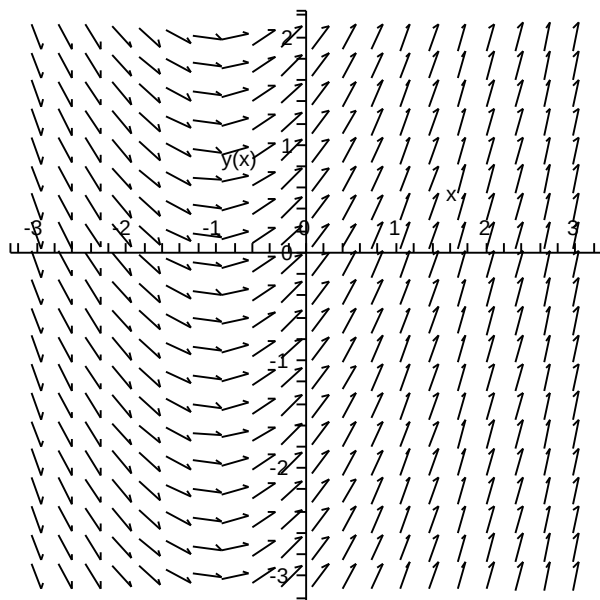
$$y' = y + 1$$



(b) $\frac{dy}{dx} = x + 1$

Solution:

$$y' = x + 1$$



3. Verify that the given solutions are really solutions to the given differential equations.

(a) $xy' + 1 = x - y$
 $y = \frac{x}{2} - 1 + \frac{C}{x}.$

(b) $xy' = y + 1$
 $y = -1 + Cx$

4. Given the general solutions, solve the initial value problem.

(a) $xy' + 1 = x - y, y(1) = 2$
 $y = \frac{x}{2} - 1 + \frac{C}{x}.$

Solution:

$$y = \frac{x}{2} - 1 + \frac{(5/2)}{x}$$

(b) $xy' = y + 1, y(2) = 5$
 $y = -1 + Cx$

Solution:

$$y = -1 + 3x$$