

Math 217 - September 2, 2010
Solutions

- Initial Value Problems
- Slope Fields

1. Which of the following are solutions to initial value problem?

$$y' = 2\sqrt{y} \quad y(0) = 0$$

- (a) $y = x^2$ YES!
- (b) $y = x^2 + 2x + 1$ NO! Doesn't satisfy the initial condition.
- (c) $y = x^2 + 4x + 4$ NO! Doesn't satisfy the initial condition.
- (d) $y = x^2 + 6x + 9$ NO! Doesn't satisfy the initial condition.
- (e) $y = 0$ YES!

2. Which of the following are solutions to the initial value problem?

$$xy' = 2y \quad y(0) = 0$$

- (a) $y = 0$ YES!
- (b) $y = x^2$ YES!
- (c) $y = 3x^2$ YES!
- (d) $y = -3x^2$ YES!

3. Solve the differential equations

(a)

$$y' = \frac{1}{x^3}$$

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

(b)

$$y' = \frac{1}{x^3}; y(1) = -2$$

Solution: $y = -\frac{3}{2} - \frac{1}{2x^2}$

(c)

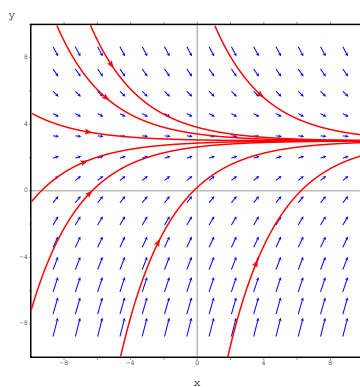
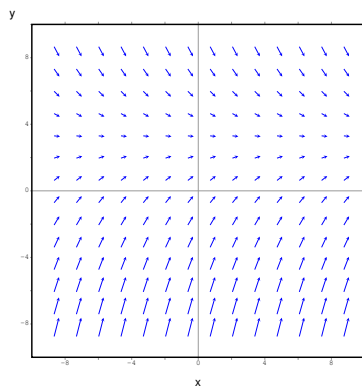
$$y' = \frac{1}{x^3}; y(0) = 1$$

Solution: No Solution!

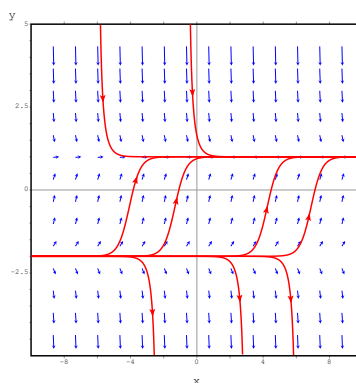
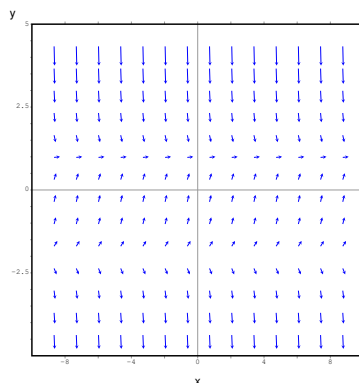
Lecture Problems

4. Draw a slopefield and some possible solution curves for $y' = -y/3 + 1$. Here are some steps that might help you:

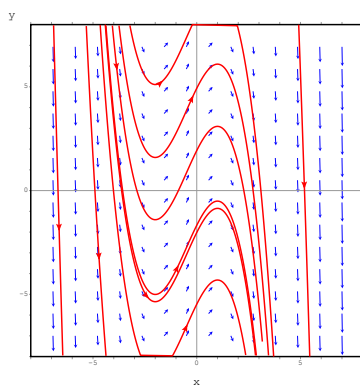
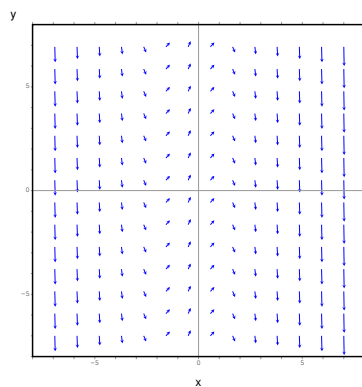
- (a) Determine where $y' = 0$ ($y = 3$)
- (b) Determine where y' is constant (constant along lines $y = x + C$)
- (c) Determine where y' is positive and negative.



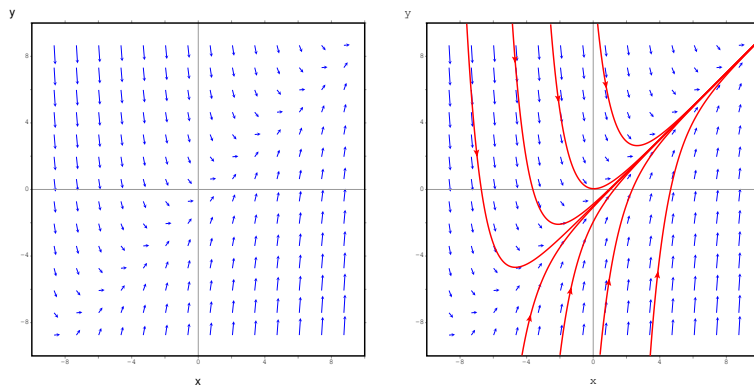
5. Draw a slopefield and some possible solution curves for $y' = (1 - y)(2 + y)$.



6. Draw a slopefield and some possible solution curves for $y' = (1 - x)(2 + x)$.



7. Draw a slopefield and some possible solution curves for $y' = x - y$.



8. Draw a slopefield and some possible solution curves for $y' = x^2 - y$.

