

Homework #3 - Sections 2.4-2.7

Last name: _____

First name: _____

Section: _____

Due at the beginning of the class on Monday July 18th, 2015.

Exercise 1.

1. Find the general solution to the differential equation

$$ty' - 3y = t^4 e^t$$

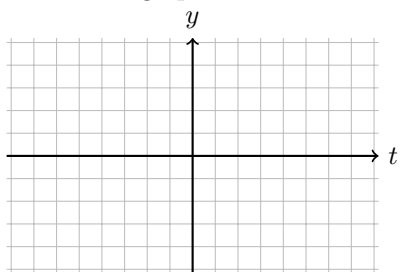
2. Show that there is no solution to the initial value problem

$$y(0) = 1$$

3. Explain why the lack of solution to the initial value problem $y(0) = 1$ does not contradict the existence uniqueness theorem.

3. Determine for which values of y the solutions are concave upward.

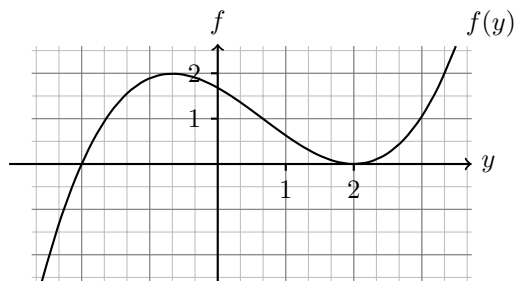
4. Sketch the graph of some solutions. Make sure you include the graph of all the equilibrium solutions.



Exercise 3. Given the autonomous differential equation

$$\frac{dy}{dt} = f(y)$$

where f is defined by its graph

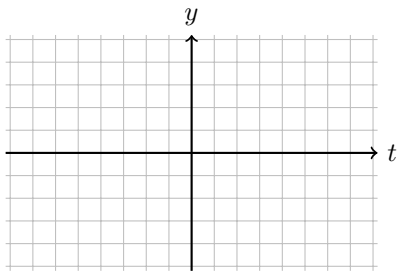


1. Find the equilibrium solutions.

2. Sketch the phase line and determine whether the equilibrium solutions are stable, unstable, or semistable.

3. Determine for which values of y the solutions are concave upward.

4. Sketch the graph of some solutions. Make sure you include the graph of all the equilibrium solutions.



Exercise 4. Consider the initial value problem

$$y' = 5 - y, \quad y(0) = 0$$

Use the Euler method with step size $h = 0.1$ to get an approximation of the solution to the initial value problem at $t = 0.3$.