MATH 319, Fall 2013, Assignment 2

Textbook Questions

Section 2.1 # 9 For the differential equation $2y' + y = 3t$, do the following:

(a) Draw a direction field for the given differential equations.

(b) Based on an inspection of the direction field, describe how solutions behave for large t.

(c) Find the general solution of the given differential equation, and use it to determine how solutions behave as $t \to \infty$.

 # 16 Find the solution of the following initial value problem:

$$y' + (2/t)y = (cos\ t)/t^2, \quad y(\pi) = 0, \quad t > 0.$$

 # 33 Show that if a and λ are positive constants, and b is any real number, then every solution of the equation

$$y' + ay = be^{-\lambda t}$$

has the property that $y \to 0$ as $t \to \infty$. [*Hint:* Consider the cases $a = \lambda$ and $a \neq \lambda$ separately.]

Section 2.2 # 5 Solve the differential equation $y' = (\cos^2\ x)(\cos^2\ 2y)$.

 # 8 Solve the differential equation $\dfrac{dy}{dx} = \dfrac{x^2}{1+y^2}$.

 # 23 Solve the initial value problem

$$y' = 2y^2 + xy^2, \quad y(0) = 1$$

and determine where the solution attains its minimum value.