

Math 231, Introduction to Differential Equations, Fall 2010

Queen's University, Department of Mathematics

Tutorial , Monday, October 4

1) Find the solution of the following differential equation,

$$\frac{dy}{dx} + \frac{ax + by}{bx + cy} = 0$$

When $a = 1, b = 2, c = 2$ solve the initial value problem with $y(0) = 1$. Can you give some idea of the interval of definition of this solution.

2. Find the solution in implicit form for the initial value problem

$$(e^x \sin y - 2y \sin x) dx + (e^x \cos y + 2 \cos x) dy = 0, \quad y(0) = \frac{\pi}{2}$$

. Can you give some idea of the interval of existence of this solution.

3. Consider the system of coupled first order equations

$$\frac{dx}{dt} = 2y, \quad \frac{dy}{dt} = 8x$$

By eliminating the time parameter, find a function $F(x, y)$ which the solutions to the system must leave constant as time changes. Graph some of the level sets of the function, and thereby indicate geometrically what the solution of the initial value problem looks like when $x(0) = 1, y(0) = 2$.