

NDU

Notre Dame University

MAT 235

Ordinary Differential Equations

Exam 1

Duration: 50 minutes

Name:

Section:

Instructor:

Grade:

1) (20 points) Consider the initial-value problem

$$y' = x + y, \quad y(0) = -1$$

a) Show that it has a unique solution without finding the solution.

b) Find the solution.

2) (15 points) Solve the differential equation

$$x \sin y \, dx + (x^2 + 1) \cos y \, dy = 0$$

3) (20 points) Find the orthogonal trajectories to the family of curves $y^2 = 1 - kx^2$, where k is an arbitrary constant.

4) (15 points) Solve the differential equation
$$y = xy' + (y')^2$$

5) (30 points) Solve the differential equation

$$(x^2 - y^2)dx + 2xydy = 0$$

by using two different methods.

