#### Notre Dame University

### Faculty of Natural and Applied Sciences

**Department of Mathematics and Statistics**

MAT 235

Ordinary Differential Equations

**EXAM 1**

**Saturday November 14, 2015**

### Duration: 60 minutes

**Name:**

**ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

##### Section:

**Instructor:**

# Directions

1. Calculators are not allowed.
2. Turn off your mobile phones.

**Please note that you have 4 pages and 6 problems**

**1) (12 points)** Consider the IVP: 

 Does the Existence and Uniqueness theorem of first-order differential equations guarantee the existence of a unique solution of the IVP? Explain.

**2) (20 points)** Solve the DE : 

**3) (20 points)** Solve the DE: 

**4) (20 points)** Solve the DE:  

**5)** **(12 points)** The general solution of the DE  on the interval  is

 

 a) Find a solution of the IVP: 

 b) Explain using the Existence and Uniqueness theorem for linear equations why the solution

 in part a) is unique.

**6) (16 points)** Suppose that  is a solution of the DE 4 on the interval. Find the general solution of the DE on this interval.