

**NDU**

**MAT 235**

**Ordinary Differential Equations**

**Exam # 1**

**Duration: 55 minutes**

**Name:** \_\_\_\_\_

**Section:** \_\_\_\_\_

**Instructor:** \_\_\_\_\_

**Grade:** \_\_\_\_\_

**1) (15 points)** Solve the following initial-value problem.

$$\frac{dy}{dx} - \frac{(x+1)}{2x}y = -3y^3 \quad \text{with } y(1) = 1. \quad x \neq 0$$

**2) (15 points)** Solve  $y' = (x + y)\ln(x + y) - 1$ , for  $x + y > 0$ .

- 3) (15 points)** Solve the differential equation  $(xy^4 - 4y^4)dx - (x^3y^2 - 3x^3)dy = 0$ .  
Is  $y = 0$  a solution? Explain.

- 4) (20 points)** Find the orthogonal trajectories to the family of curves  $x^2 + y^2 = cx^3$  where  $c$  is an arbitrary constant.

**5) (20 points)** Solve  $y' = (1-x)y^2 + (2x-1)y - x$  given that  $y_1(x) = 1$  is a particular solution.

**6) (15 points)** Solve  $[y^2(x+1)+y]dx+(2xy+1)dy=0$ .