

NDU

MAT 235

Ordinary Differential Equations

Exam # 1

Duration: 55 minutes

Name: _____

Section: _____

Instructor: _____

Grade: _____

1) (15 points) Solve the differential equation $x \frac{dy}{dx} - 3y = -\frac{y^3}{x^4}$, for $x > 0$.

2) (15 points) Find the family of orthogonal trajectories of the family of curves $y = c \ln x$, for $x > 0$.

3) (15 points) Solve the initial-value problem $\frac{dy}{dx} = \frac{(y-3x+5)^2 + 7}{2}$, with $y(2) = 1$.

4) (18 points) Solve $(\sin y + x^2 + 2x)dx + \cos y dy = 0$.

5) (20 points) Solve the differential equation $x \frac{dy}{dx} - y = x \left(1 - e^{-y/x} \right)$.

- 6) (17 points)** Given that $y_1 = x^2$ is a particular solution of the differential equation $x^3 \frac{dy}{dx} - 5x^2 y = -y^2 - 2x^4$, for $x > 0$; find the general solution.