

NDU

MAT 235

Ordinary Differential Equations

Exam # 1

Duration: 60 minutes

Name: _____

Section: A

Instructor: Dr. Ishac Zoghbi

Grade: _____

1) (18 points) Solve the differential equation $3\frac{dy}{dx} + 2y = 2xe^{-2x} \frac{1}{y^3}$.

2) (22 points) Solve the differential equation $\frac{dy}{dx} = \frac{x^2 + y^2 + 1}{xy + y}$.

3) (22 points) Solve the initial value problem

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

then give the explicit value of y .

4) (16 points) Find a family of oblique trajectories that intersect the family of hyperbolas $y^2 - x^2 = c$ at angle 45° .

5) (22 points) Given that $y = e^x$ is a solution of $(x^2 - 2x)y'' + (2 - x^2)y' + (2x - 2)y = 0$, for $x > 2$, find a linearly independent solution by reducing the order. Write the general solution.