

Introduction to Differential Equations

Assignment # 3

Date Given: April 25, 2022

Date Due: May 2, 2022

- P1.** (1 point) Determine (without solving the problem) an interval in which the solution of the initial value problem $(t - 3)y' + (\ln t)y = 2t$, $y(1) = 2$ is certain to exist.
- P2.** (1 point) Determine (without solving the problem) an interval in which the solution of the initial value problem $(4 - t^2)y' + 2ty = 3t^2$, $y(-3) = 1$ is certain to exist.
- P3.** (2 points) Determine whether the equation $(3x^2 - 2xy + 2) + (6y^2 - x^2 + 3)y' = 0$ is exact or not. If it is exact, find the solution.
- P4.** (2 points) Determine whether the equation

$$(ye^{xy} \cos 2x - 2e^{xy} \sin 2x + 2x) + (xe^{xy} \cos 2x - 3)y' = 0$$

is exact or not. If it is exact, find the solution.

- P5.** (2 points) Solve the initial value problem

$$(2x - y) + (2y - x)y' = 0, \quad y(1) = 3$$

and determine the interval where the solution is valid.

- P6.** (2 points) Show that the equation $(x + 2) \sin y + (x \cos y)y' = 0$ is not exact but becomes exact when multiplied by the integrating factor $\mu(x, y) = xe^x$. Then solve this equation.