

AI-C 201 Differential Equations

Homework 3

(Deadline: 8st Oct, 2026)

1. Solve

$$\frac{dy}{dt} = 3(2+t)\sqrt{4-y^2}, \quad y(1) = 0 \quad (1)$$

2. Solve

$$\frac{dy}{dt} = 5e^{2t+4y}, \quad y(t_0) = y_0 \quad (2)$$

3. Find an integrating factor for the equation

$$(3xy + y^2) + (x^2 + xy)y' = 0 \quad (3)$$

and then solve the equation.

4. Find all solutions of the equation

$$3y^2y' + y^3 = e^{-x} \quad (4)$$

5. Find the second in the sequence of successive approximations to the solution of

$$\frac{dy}{dt} + 3y + \varepsilon y^2 = 3, \quad y(0) = 0 \quad (5)$$

given that the first is the solution when $\varepsilon = 0$.