

Assignment-2

1. Solve $x(1 - x^2)dy + (2x^2y - y - ax^3) dx = 0$.
2. Solve $y \ln y dx + (x - \ln y) dy = 0$.
3. Solve the initial value problem $\frac{dy}{dx} = \frac{2}{x}y + x$, $y(1) = 2$.
4. Solve $\frac{dy}{dx} + \frac{y}{x} \ln y = \frac{y}{x^2} (\ln y)^2$.
5. Solve $x^3 \frac{dy}{dx} - x^2y + y^4 \cos x = 0$.
6. Define the Wronskian $w(y_1; y_2)$ of any two differentiable functions y_1 and y_2 defined in an interval $(a, b) \subset \mathbb{R}$. Show that $w(y_1; y_2) = 0$ if y_1 and y_2 are linearly dependent.
7. Find the general solution of the second order equation $(x - 1)y'' - xy' + y = 0$, knowing that a polynomial is a solution.
8. Find the general solution of the second order equation $xy'' - (2x + 1)y' + (x + 1)y = 0$, knowing that an exponential function is a solution.
9. Find the general solution of $y'' - 3y' + 2y = 0$.
10. Find the solution of the initial value problem $y'' - 2y' + 3y = 0$, $y(0) = 1$, $y'(0) = 4$.