ASSIGNMENT

M.Sc. Sem-II (O.D.E.)

Paper — CCMATH202

1) Explain Picard's Method of Successive Approximations. Find the third approximation of the solution of the eqⁿ

$$\frac{dy}{dx} = 2 - \frac{y}{x}$$

by Picard's method where $y = 2$ when $x = 1$.

2) State and Prove Picard's Existence and Uniqueness theorem.

3) Define Wronskian.
Prove that two solutions $y_1(x)$ and $y_2(x)$ of the eqⁿ

$$a_2(x)y'' + a_1(x)y' + a_2(x)y = 0$$

are linearly dependent iff their wronskian is identically zero, where $a_0(x) \neq 0$, a_1, a_2 are continuous functions of $[a, b]$

4) P.T. the wronskian of two solution of the eqⁿ $a_0(x)y'' + a_1(x)y' + a_2(x)y = 0$ is either identically zero or never zero $\forall\ x \in [a, b]$
where $a_0(x) \neq 0$, $a_1(x), a_2(x)$ are continuous functions on the given interval.

5) Solve the initial-value Problem

$$\dot{x} = \begin{bmatrix} 2 & 1 & 3 \\ 0 & 2 & -1 \\ 0 & 0 & 2 \end{bmatrix} x, \qquad x(0) = \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$$