DEPARTMENT OF MATHEMATICS, IIT DELHI
SEMESTER II 2024 – 25
MTL 101 (Linear Algebra and Differential Equations) - Quiz 3

Date: 23/04/2025 (Wednesday) Time: 7:15 PM - 8:00 PM.

"As a student of IIT Delhi, I will not give or receive aid in examinations. I will do my share and take an active part in seeing to it that others as well as myself uphold the spirit and letter of the Honour Code."

Name :		BLOCK LETTER ONLY	
Entry Number:		**Group:**	
Gradescope Id:		**Lecture Hall:**	

Question 1: Find the general solution of the differential equation using the variation of parameters:

$$xy'' - (2x-1)y' + (x-1)y = e^x.$$

Given that $y_1 = e^x$ is one of the fundamental solution of the associated homogeneous equation.

[6]

Question 2: Find the values of $\alpha \in \mathbb{R}$, for which all the solutions of the ODE

$$y''(x) + 2y'(x) - \alpha y(x) = 0$$

[4]

go to zero as $x \to +\infty$.

Question 3: Find the general solution of the following system of differential equations:

$$\begin{cases} \frac{dy_1}{dt} = -3y_1 - 4y_2 \\ \frac{dy_2}{dt} = 5y_1 + 6y_2. \end{cases}$$

[3]