Q1. (3 points) Solve the IVP: \( y'' + 6y' + 9y = 0 \) with \( y(0) = 0; \ y'(0) = 1 \).

Q2. (2 points) \( y_1 = \cos 2x \) and \( y_2 = \sin 2x \) are two solutions of a second order differential equation. Check if the solutions are linearly independent or linearly dependent.

Q3. (3 points) Guess \( y_p \) for the differential equation \( y''' + 4y' = e^x \sin x + \sin 2x - 1 \). The solution of the associated homogeneous equation are: \( y_{1c} = 1, \ y_{2c} = \cos 2x, \ y_{3c} = \sin 2x \).

Q4. (2 points) The solutions of the associated homogeneous differential equation \( y'' - y = -1 \) are \( y_{1c} = e^x \) and \( y_{2c} = e^{-x} \). Using variation of parameters method find \( y_p \).