Show all of your work as partial credit will be given.

1. Of the three functions

\[ y_1 = e^{2x}, \ y_2 = e^{3x}, \ y_3 = e^{4x} \]

two functions are solutions to the homogeneous equation

\[ y'' - 5y' + 6y = 0. \quad (1) \]

(i) Identify which two functions are the solutions of (1),
(ii) Find a solution of (1) that satisfies the initial conditions

\[ y(0) = -1, \ y'(0) = -4. \]

2. Find a general solution to

\[ y'' + 4y' + 8y = 0. \]

\textbf{Answers}

\textbf{Problem 1.}

\[ y = e^{2x} - 2e^{3x} \]

\textbf{Problem 2.}

\[ y = c_1e^{-2t}\cos 2t + c_1e^{-2t}\sin 2t \]