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

$$y'' - 5y' + 6y = 0. \tag{1}$$

(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

$$y'' + 4y' + 8y = 0.$$

Answers

Problem 1.

$$y = e^{2x} - 2e^{3x}$$

Problem 2.

$$y = c_1 e^{-2t}\cos 2t + c_1 e^{-2t}\sin 2t$$