



Student 1 Roll No. _____

Evaluator 1 Roll No. _____

Student 2 Roll No. _____

Evaluator 2 Roll No. _____

Problem 1 (90 Marks)

Find the general solution of the following initial and boundary value problems. Then using the given conditions, sketch the graph of the solution. Also specify whether the differential equation has a stable, unstable or marginally stable equilibrium point.

(i) $y'' + 5y' + 4y = 0,$ $y(0) = 1$ and $y'(0) = 1$

(ii) $y'' + 5y' = 0,$ $y(0) = 0$ and $y'(0) = 1$

(iii) $y'' + y' - 2y = 0,$ $y(0) = 1$ and $y'(0) = 0$

(iv) $6y'' - 5y' + y = 0,$ $y(0) = 4$ and $y(5) = -2$

(v) $y'' + y = 0,$ $y(0) = 1$ and $y'(0) = -1$

(vi) $y'' + 2y' + 2y = 0,$ $y(0) = 1$ and $y'(0) = -1$

(vii) $y'' - 2y' + 2y = 0,$ $y(0) = 0$ and $y'(0) = 1$

(viii) $y'' + 4y' + 4y = 0,$ $y(0) = 0$ and $y'(0) = -1$

(ix) $y'' = 0,$ $y(0) = -2$ and $y(5) = 3$