

**Homework 4 (MATH 2310-04)****Name (Print):****Due date: Thursday, March 6, 2014**

1. Find the solution of the given initial value problem. Describe the behavior of the solution as  $t$  increases.

$$y'' + 3y' = 0, \quad y(0) = -2, \quad y'(0) = 3$$

**Solution :**

$$y(t) = -1 - e^{-3t}$$
$$t \rightarrow \infty: y = -1$$

2. Find the solution of the given initial value problem. Describe the behavior of the solution as  $t$  increases.

$$y'' + y' - 2y = 0, \quad y(0) = 1, \quad y'(0) = 1$$

**Solution :**

$$y(t) = e^t$$
$$t \rightarrow \infty: y = e^t$$

3. Find the solution of the given initial value problem. Then find  $\beta$  so that the solution approaches zero as  $t \rightarrow \infty$ .

$$4y'' - y = 0, \quad y(0) = 2, \quad y'(0) = \beta$$

**Solution :**

$$y(t) = (1 - \beta)e^{-t/2} + (1 + \beta)e^{t/2}$$
$$\beta = -1: y \rightarrow 0 \text{ as } t \rightarrow \infty$$