

**Due at the beginning of class on the day of Test 1**

*Direction: Solve the problems in this worksheet on separate sheets of paper. Write your solution neatly. Use standard size paper. Clearly label each problem, and include each problem in the correct order. No ragged edges. Staple multiple pages. At the top of the first page put your name, Math 2320, and the title of the homework assignment. Show all work to justify your answer. Answer with insufficient work will receive no credit.*

### Problem 1: Solve linear second order equations

Find the general solution to the given differential equation:

1.  $y'' + 5y' + 6y = 0$

3.  $4y'' - 4y' + y = 0$

2.  $y'' + 6y' + 9y = 0$

4.  $y'' + 9y = 0$

### Problem 2: Solve an IVP

Solve the given IVP:

1.  $y'' + 2y' + 17y = 0, y(0) = 1, y'(0) = -1$

2.  $y'' - 4y' - 5y = 0, y(-1) = 3, y'(-1) = 9$

### Problem 3: Higher Order Equations - Real and Distinct Roots

Find the general solution to the given differential equation:

1.  $y''' - 3y'' - y' + 3y = 0$

2.  $y^{(4)} - y''' - 4y'' + 4y' = 0$

### Problem 4: Higher Order Equations-Repeated Real Roots

Find the general solution to the given differential equation:

1.  $y^{(5)} + 5y^{(4)} - 2y''' - 10y'' + y' + 5y = 0$

2.  $y''' + 3y'' + 3y' + y = 0$

### Problem 5: Higher Order Equations-Distinct Complex Roots

Find the general solution to the given differential equation:

$$y^{(4)} + 5y'' + 6y = 0.$$

### Problem 6: Higher Order Equations-Repeated Complex Roots

Find the general solution to the given differential equation:

$$y^{(4)} + 2y'' + y = 0.$$