

## Math 54 Worksheet

### SECOND-ORDER HOMOGENEOUS LINEAR EQUATIONS

#### Part A

These questions test your knowledge of the core concepts and computations.

1. Find the general solution to the following Differential Equations

(a)  $y'' + y' - 6y = 0$

(c)  $4y'' + 12y' + 9y = 0$

(b)  $3\frac{d^2y}{dx^2} + \frac{dy}{dx} - y = 0$

(d)  $y'' - 6y' + 13y = 0$

**Solution:**

## Part B

These questions are generally more challenging, often highlighting important subtleties. They require a deeper understanding of each concept and the interrelations between them.

2. Solve the following initial-value problems, if possible

(a)  $y'' + y' - 6y = 0$ ,  $y(0) = 1$ ,  $y'(0) = 0$

(b)  $y'' + y = 0$ ,  $y(0) = 2$ ,  $y'(0) = 3$

(c)  $y'' + 4y' + 20y = 0$ ,  $y(0) = 1$ ,  $y(\pi) = 2$

**Solution:**