MATH 2400: Suggested Homework 3

In each of the following problems find the general solution of the given differential equation:

1. $y'' + 2y' - 3y = 0$ 2. $y'' + 5y' = 0$ 3. $y'' - 2y' - 2y = 0$

4. Find the solution of the initial value problem

$$y'' + 8y' - 9y = 0, \qquad y(0) = 1, \quad y'(0) = 0$$

Sketch the graph of this solution and describe its behavior as x increases.

In each of the following problems find the general solution of the given differential equation:

5. $y'' - 2y' + 6y = 0$ 6. $y'' + 2y' + 2y = 0$ 7. $y'' + 6y' + 13y = 0$

8. Find the solution of the initial value problem

$$y'' + 4y' + 5y = 0, \qquad y(0) = 1, \quad y'(0) = 0$$

Sketch the graph of this solution and describe its behavior as x increases.

In each of the following two problems find the general solution of the given differential equation:

9. $y'' - 2y' + y = 0$ 10. $y'' - 6y' + 9y = 0$

Find the solution of the following initial value problems:

11. $y'' + y' - 2y = 2x, \qquad y(0) = 0, \quad y'(0) = 1$
12. $y'' + 4y = x^2 + 3e^x, \qquad y(0) = 0, \quad y'(0) = 2$
13. $y'' - 2y' + y = xe^x + 4, \qquad y(0) = 1, \quad y'(0) = 1$

In the following problems, determine the suitable **form** for the particular solution. You do not need to evaluate the constants.

14. $y'' + 3y' = 2x^4 + x^2e^{-3x} + \sin 3x$
15. $y'' + 2y' + 2y = 3e^{-x} + 2e^{-x}\cos x + 4e^{-x}x^2 \sin x$
16. $y'' - 4y' + 4y = 2x^2 + 4xe^{2x} + x\sin 2x$

In the following three problems, find the general solution to the given differential equation:

17. $y'' + 2y' = 3 + 4\sin 2x$ 18. $2y'' + 3y' + y = x^2 + 3\sin x$
19. $\ddot{u} + \omega_0^2 u = \cos \omega_0 t$

In the following problems, determine the suitable **form** for the particular solution. You do not need to evaluate the constants.

20. $y'' + y = x(1 + \sin x)$
21. $y'' - 5y' + 6y = e^x \cos 2x + e^{2x}(3x + 4)\sin x.$