Homework Set 8
(Section 3.3 & 3.5)

For questions 1 through 6, find the general solution for the given differential equation. If initial conditions are given, find the particular solution which satisfies the initial conditions.

1. $y'' - 4y = 0$

2. $y^{(4)} + 3y'' - 4y = 0$

3. $y^{(4)} = 16y$

4. $y^{(3)} + y'' - y' - y = 0$

5. $y'' - 6y' + 25y = 0; \ y(0) = 3, \ y'(0) = 1$
6. $y^{(3)} + 2y'' = 0; \ y(0) = -1, \ y'(0) = 0, \ y''(0) = 1$

For questions 7 through 9, find a particular solution $y_p$ of the given differential equation.

7. $y'' - y' - 2y = 3x + 4$

8. $4y'' + 4y' + y = 3xe^x$

9. $y^{(3)} - y = e^x + 7$
For questions 10 and 11, use the method of variation of parameters to find a particular solution of the given differential equation.

10. \( y'' - 4y = \cos 3x \)

11. \( y'' - 4y = xe^x \)

For questions 12 through 14, solve the initial value problems.

12. \( y'' + 3y' + 2y = e^x; \quad y(0) = 0, \quad y'(0) = 3 \)
13. $y'' + y = \cos x$; $y(0) = 1$, $y'(0) = -1$

14. $y^{(4)} - y = 5$; $y(0) = y'(0) = y''(0) = y^{(3)} = 0$