Note ♯6: Sections 3.5-3.6

Problem 1. Find the forms of particular solutions for the differential equations.

(a) $y'' - 3y' + 2y = -2t^2e^{4t}$

(b) $y'' - 3y' + 2y = -2t^2e^{2t}$

(c) $y'' - 4y' + 4y = -2t^2e^{4t}$

(d) $y'' - 4y' + 4y = -2t^2e^{2t}$

(e) $y'' - 4y' + 4y = 3e^{2t}\cos(2t)$

(f) $y'' - 4y' + 13y = 3e^{2t}\cos(2t)$

(g) $y'' - 4y' + 13y = 3e^{2t}\cos(3t)$

Problem 2. Find the general solutions of the given differential equations using the method of undetermined coefficients.

(a)

$$y'' - 2y' - 3y = 3e^{2t}$$

(b)

$$y'' - 2y' - 3y = -3te^{-t}$$

(c)

$$y'' - 2y' - 3y = 3e^{2t} - 3te^{-t}$$

Problem 3. Find the solution of the given initial value problem using the method of undetermined coefficients.

$$y'' - 2y' + y = te^t + 4, \quad y(0) = 1, \quad y'(0) = 1$$

Problem 4. Use the method of variation of parameters to find a particular solution.

$$y'' - y' - 2y = 2e^{-t}$$

Problem 5. Verify that the given functions y_1 and y_2 satisfy the corresponding homogeneous equation; then find a particular solution of the given nonhomogeneous equation.

$$ty'' - (1+t)y' + y = t^2e^{2t}, \quad t > 0; \quad y_1(t) = 1 + t, \quad y_2(t) = e^t$$