

Exam #1 Review - Additional Questions

1. Solve the initial value problem

$$y'' - 6y' + 9y = 0; \quad y(0) = 1, y'(0) = -2$$

2. Consider the differential equation

$$x'' - 8x' + 16x = 0$$

- (a) Find the general solution to the differential equation.
(b) Find the particular solution to the differential equation satisfying $x(0) = 3$, $x'(0) = 5$.

3. Consider the linear, second order differential equation

$$y'' - 6y' + 9y = g(t)$$

- (a) Find the complementary solution for this differential equation.
(b) Suppose that $g(t) = (9t - 3)e^{6t}$. Using the method of undetermined coefficients, find a particular solution to the equation in this case.
(c) Now suppose that $g(t) = t^2(\cos(2t) + e^{-2t})$. What should your “first guess” be for the form of the particular solution? (Do not solve for the coefficients! Leave them undetermined.)

4. Consider the linear, second order differential equation

$$y'' - 4y' + 4y = g(t)$$

- (a) Find the complementary solution for this differential equation.
(b) Suppose that $g(t) = (t + 3)e^{3t}$. Using the method of undetermined coefficients, find a particular solution to the equation in this case.
(c) Now suppose that $g(t) = t^2e^{-2t}\cos(2t)$. What should your “first guess” be for the form of the particular solution? (Do not solve for the coefficients! Leave them undetermined.)