MATH 246 Homework 2.6 & 2.7 Justin Wyss-Gallifent

Directions:

- Work should be done neatly and on separate paper.
- Enough work must be shown so that the steps you are taking is clear.
- 1. Solve the following using the Method of Undetermined Coefficients.
 - (a) $y'' + 2y' 15y = e^{6t}$
 - (b) $y'' + 2y' 15y = e^t \cos(2t)$
 - (c) $y'' + 2y' 15y = te^{3t}$ with y(0) = 1 and y'(0) = 3
- 2. Find general solutions to the following DEs using Variation of Parameters. A fundamental pair of solutions to the associated homogeneous differential equation is given.
 - (a) $y'' 5y' + 6y = 2e^t$ with $Y_1(t) = e^{2t}$ and $Y_2(t) = e^{3t}$.
 - (b) $t^2y'' 2y = 3t^2 1$ with $Y_1(t) = t^2$ and $Y_2(t) = t^{-1}$.
 - (c) $x^2y'' 3xy' + 4y = x^2 \ln x$ with $Y_1(x) = x^2$ and $Y_2(x) = x^2 \ln x$.
- 3. Consider the differential equation $y'' 3y' 10y = t^2 e^{5t}$.
 - (a) Find the characteristic polynomial and roots for the associated homogeneous differential equation.
 - (b) Find the fundamental pair for the associated homogeneous differential equation.
 - (c) Find a specific solution to the original DE using Undetermined Coefficients.
 - (d) Find a specific solution to the original DE using Variation of Parameters.
 - (e) Solve the initial value problem having $y(\ln 2) = 1$ and $y'(\ln 2) = -1$.