MATH 218 Differential Equations, Assignment 7 Due Tues Oct 28

1: Find the 5^{th} Taylor polynomial centered at 0 for the solution to the initial value problem $(1-x)\,y'' - 2y = 4$ with $y(0) = 1$ and $y'(0) = 3$.

2: Find the 5^{th} Taylor polynomial centered at 0 for the solution to the initial value problem $y'' + 2y' + e^x y = \sin x$ with $y(0) = 2$ and $y'(0) = 1$.

3: Use the Power Series Method to solve the DE $y'' + (x-1)y' + y = 0$. Find two linearly independent power series solutions, one satisfying the initial conditions $y(0) = 1$, $y'(0) = 0$, and the other satisfying $y(0) = 0$, $y'(0) = 1$. For each solution, state the recurrence relation for the coefficients, and find the 5^{th} Taylor polynomial centered at 0.

4: Use Frobenius' Method to solve the DE $4xy'' + 2y' = y$. Find two linearly independent series solutions. For each solution, solve the recurrence relation to obtain an explicit formula for the n^{th} coefficient, then find a closed form formula for the solution.

5: Use Frobenius' Method to solve the DE $3x^2y'' + x(x-1)y' + y = 0$. Find two linearly independent series solutions. For each solution, solve the recurrence relation to obtain an explicit formula for the n^{th} coefficient. Find a closed form formula for one of the two solutions.