Partial Differential Equations
Spring 2015

Assignment 11
Due April 9

Instructions: In each of the following exercises: **(a)** show that $x = a$ is an ordinary point of the given ODE, and determine a lower bound on the radii of convergence of the power series expansions of solutions at $x = a$; **(b)** find the recurrence relation satisfied by the coefficients of the power series expansions of solutions at $x = a$; **(c)** find the first 5 (nonzero) terms in the power series expansions (at $x = a$) of each of two linearly independent solutions; **(d)** for problems marked with an asterisk (*), find a general expression for the coefficients in the solutions from part **(c)**, and determine their radii of convergence exactly.

Exercise 1.* $y'' - 2xy' + y = 0$, $a = 0$

Exercise 2.* $y'' - xy = 0$, $a = 0$

Exercise 3.* $(1 + x^2)y'' - 4xy' + 6y = 0$, $a = 0$

Exercise 4. $2(x + 1)y'' + y' + 3y = 0$, $a = 2$

Exercise 5. $y'' + y' + e^x y = 0$, $a = 0$