Math 1B: Calculus **Spring 2020**

Discussion 30: Series Solution

Instructor: Alexander Paulin Date: April 20, 2020

The basic idea to finding a series solution to a differential equation is to assume that we can write the solution as a power series in the form, $y(x) = \sum_{n=0}^{\infty} a_n(x - x_0)^n$ and then try to determine what the a_n's need to be. In our book, x_0 is 0 by default.

1. Use power series to solve the differential equation.

   1. $y' = x^2 y$

   2. $y' + 2xy = 0$

   3. $(x + 1)y' = 3y$

   4. $y'' + xy' + y = 0$

5. $y'' = xy$

2. Use power series to solve the initial value problem.

1. $y'' - xy' - y = 0, \quad y(0) = 1, \quad y'(0) = 0$

2. $y'' + x^2 y = 0, \quad y(0) = 1, \quad y'(0) = 0$

3. $y'' + x^2 y' + xy = 0, \quad y(0) = 0, \quad y'(0) = 1$