Math 222, Spring 2016.

Present your work in an organized fashion. Make sure that your work is algebraically correct and logically sound. Show all your work. Discussion (if necessary) with others is encouraged, while copying other's solution is a violation of NJIT student honor code. Do not forget that you should also be able to do (but not hand in) the homework problems listed on the syllabus.

Homework Problems for Chapter 5

1. Determine the radius of convergence of the following power series.

   (a) $\sum_{n=0}^{\infty} \frac{n}{2^n} x^n$.

   (b) $\sum_{n=0}^{\infty} \frac{n! x^n}{n^n}$.

2. Determine all the singular points of the following differential equations, and classify each singular point as regular or irregular.

   (a) $(x+1)y'' - x^2 y' + 3y = 0$.

   (b) $(x^2 + x)y'' + 3y' - 6xy = 0$.

   (c) $(x^2 - x - 2)y'' + (x+1)y' - (x-2)y = 0$.

3. For the following differential equations, determine the general power series solutions with center at 0 and write out the first four terms in the series.

   (a) $y' = xy$,

   (b) $9x^2 y'' + 9x^2 y' + 2y = 0$,

   (c) $y'' - xy' - y = 0$.

4. Consider the Hermite's equation $y'' - 2xy' + \lambda y = 0$. Find the first four terms in each of the two solutions about $x = 0$. Then observe that if λ is a nonnegative even integer, then one of the series solutions terminates and becomes a polynomial. Find the polynomial for $\lambda = 0, 2, 4$.