Math 324 Exam 2

15 January 2016

Name:

1. Show that the function $f(x) = \frac{1}{(1-x)^2}$ is analytic at 0.

2. For each, determine if 0 is an ordinary point, a regular singular point, or an irregular singular point. If 0 is a regular singular point, then find the indicial polynomial and compute its roots.

   (a) $4x^2y'' - 4xe^xy' + 3\cos(x)y = 0$

   (b) $x^2y'' + \sin(x)y' + \cos(x)y = 0$

   (c) $x^2y'' - 5y' + 3x^2y = 0$

   (d) $x^2y'' - x^3y' + x^2y = 0$

3. Find a nontrivial solution to $x^2y'' + 3xy' + (1 + x)y = 0$.

4. Find a nontrivial solution to $x^2y'' - x^3y' + x^2y = 0$.