Math 308 Quiz 8

Due: Friday, March 29, 2024

Name: _____ **UIN:** _____

Directions: Please upload a PDF file of your solutions on Gradescope by Friday 29 March at 10pm. You may discuss in groups but please submit your own work.

1. (a) (5 points) Find the first 5 coefficients a_0, a_1, a_2, a_3, a_4 of the power series expansion at zero $y(x) = \sum_{n=0}^{\infty} a_n x^n$ of the initial value problem

$$(1-x)y'' = y, \quad y(0) = 1, \quad y'(0) = 2$$

(b) (5 points) Use Fuch's Theorem to estimate the radius of convergence of this power series.

2. (5 points) Find the power series solution of the equation

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

3. (5 points) The function $y(x) = \sum_{n=0}^{\infty} a_n x^n$ is a solution of the equation

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

Find the power series solution for y.