Student ID: KEY

Student Name: SOLUTION

Serial Number:

Math 202, Section 3 and 4
Spring 2015, Term 142

Quiz 4
Version A and B

Instructions: Show Your Work!

1. (4 pts) Consider the differential equation

$$(\sin x)\, y'' + y' + 5y = 0. \qquad (\mathrm{DE}^*)$$

(a) Explain why (DE*) has two solutions of the form

$$\sum_{n=0}^{\infty} c_n \left(x - \frac{\pi}{2}\right)^n.$$

(b) Find the minimum radius of convergence of the power series solutions in part (a).

2. (3 pts) Classify the singular points of the following differential equation

$$x^3 \left(x^2 - 25\right) (x-2)^2\, y'' + 3x\,(x-2)\, y' + 7\,(x-5)\, y = 0.$$

3. (3 pts) Consider the differential equation

$$2xy'' - y' + 2y = 0,$$

Find the indicial roots of the singularity at the regular singular point $x = 0$.