Math 202-Section 11 Home Quiz 6

Sr. Num.: ID. Num.: Name:

Q 1 [6 points]: Determine and classify all singular points of the differential equation:

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

Q 2: Consider the ordinary differential equation:

$$x^2y'' + 5xy' + (4-x^2)y = 0.$$

a) [3 points] Without using series, show that the indicial roots of the differential equation are equal.

b) [3 points] Find one series solution of the differential equation about the point $x = 0$, and use part a) to obtain the second solution.

Q 3 [5 points] Use series solution to solve the differential equation

$$y'' + y = 0$$

about the point $x = 0$. Also, show that $y = c_0 \cos x + c_1 \sin x$.

Q 4 [5 points] Use power series solution centered at $x = 0$ to find a fundamental set of solutions for the differential equation

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