Disclaimer: *This practice exam is representative of problems that could appear on your exam, but it does not cover all eligible topics. While some problems on the actual exam may be similar, you should not expect that all exam problems are represented on a practice exam.*

Math 335
Practice Exam 2

NAME: _____

PLEASE PRINT

You have 75 minutes to complete this exam. No notes or calculators are allowed. Show all work. Unsupported or illegible answers will receive no credit. There are a total of 50 points on this exam.

PAGE	SCORE	POINTS
1		10
2		10
3		10
4		20
TOTAL		50

1.) *[6 points]* Classify each differential equation below as PDE or ODE, linear or nonlinear, and specify the order.

a.) $x^3 y'' - y' \cos 2x = 4y$

b.) $f_{xx} = x^2 + y^2$

c.) $f_x f_y = x^3 + 2y + 3$

2.) *[4 points]* Find all singular points of the ODE below and classify the points as regular or irregular.

$$\left(x^2 - 9\right)y'' - (x+3)y' + 4y = 0$$

3.) *[10 points]* Find the first 5 terms (through x^4) of the series solution about x=0 of the ODE

$$3y'' - 4y' + x^2 y = 0$$

4.) *[10 points]* Use your answer to #3 to find the solution of the Initial Value Problem

$$3y'' - 4y' + x^2 y = 0, \qquad y(0) = 0, \qquad y'(0) = 4$$

5.) *[20 points]* Note x=0 is a regular singular point of the ODE

$$2xy'' + 5y' + xy = 0$$

Find the indicial roots of the ODE and the general recurrence relation in terms of n and r.