Math 335 Exam 1

NAME:	DI EACE DD DE
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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		6
2		6
3		10
4		8
5-6		20
TOTAL		50

1.) [6 points] Shift the series below so that the variable is x^n .

$$a.) \sum_{k=2}^{\infty} a_k x^{k+1}$$

b.)
$$\sum_{i=4}^{\infty} (i+3)b_{i-1}x^{i-2}$$

2.) [6 points] Find all singular points of the ODE below and classify the points as regular or irregular. Show work to justify your classification.

$$x^{2}(x+2)^{2}y'' - xy' + y = 0$$

3.) [10 points] Find the first 5 terms (through x⁴) of the series solution about x=0 of the ODE 3y''-2xy=0

Write your coefficients in the blanks below in terms of a_0 and a_1 .

4.) [8 points] Use your answer to #3 to find the solution of the Initial Value Problem

$$3y'' - 2xy = 0$$
, $y(0) = 2$, $y'(0) = 1$

Write the series through x^4 , as in the last problem.

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

$$xy'' + 3y' + 10y = 0$$

Using the Method of Frobenius about x=0, find the indicial roots of the ODE and the general recurrence relation in terms of n and r. (You do not need to find the Frobenius series solutions. The next page is left blank if you need more room for your work.)

#5 continued...