Math 335 HW 8 **NAME:** _____
Due Wednesday 10/22 5:15pm

Practice Problems *(Do not turn in.)*
Sec 5.1 #9, 29, 33, 35

Print out this assignment and write all work directly on this worksheet. Do not attach extra pages. Show all work. Your answers must be clear and legible. All pages must be stapled. Homework may be submitted within 24 hours of the due date with an automatic 2 point deduction. After Thursday 5:00pm, no late homework will be accepted for any reason.

1.) *[4 points]* Rewrite the expression as a single power series whose general term involves x^k. You may need to preface the power series with a term or two. Be sure to write the starting index of the summation clearly.

a.) $\sum_{n=1}^{\infty}(n-2)a_n x^{n-1} + \sum_{n=2}^{\infty}(n+3)a_n x^{n-2}$

b.) $\sum_{n=0}^{\infty} n a_n x^n - 4x\sum_{n=2}^{\infty} a_n x^{n-2} + \sum_{n=2}^{\infty} n(n-3)a_n x^{n-1}$

2.) *[6 points]* Find the first 5 terms of a power series solution about $x = -2$ to the Airy equation

$$y'' - xy = 0 .$$

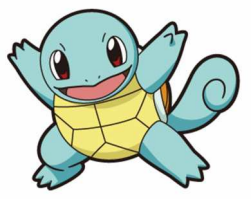
That is, solve for the values of a solution of the form $y = \sum_{n=0}^{\infty} a_n (x+2)^n$ through the $(x+2)^4$ term. *(Hint: In lecture, we found a solution centered around x=0. You may find it useful to read Paul's Notes linked on our course website.)*

$y = a_0 + a_1(x+2) + \_\_\_\_\_(x+2)^2 + \_\_\_\_\_(x+2)^3 + \_\_\_\_\_(x+2)^4 + \cdots$

3.) *[6 points]* Use the infinite series to find a *recurrence relation* that describes the terms of the power series solution about $x=0$ to the ODE

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

You do not need to write out the series.



4.) *[4 points]* Use your answer to #3 to solve the ODE with the following initial conditions:

$$(x+2)y'' + xy' - y = 0, \quad y(0) = 3, \quad y'(0) = 2.$$

Write out the first 5 terms of the series (through x^4).

$y =$ _____ + _____ x + _____ x^2 + _____ x^3 + _____ $x^4 + \cdots$