1. (16) In this problem show all work. In particular, mention any test that you might use and verify that it is applicable. A correct answer with incorrect work will be considered wrong.

(a) Find the radius of convergence of the power series

$$\sum_{n=2}^{\infty} \frac{(x+1)^n}{2^n \sqrt{n}}.$$

(b) Find the interval of convergence.

2. (13) Write down the first four non-zero terms of a Taylor series expansion centered at $a = 3$ of the function

$$f(x) = (1 + x)^{3/2}.$$

3. (13) Find the MacLaurin series expansion for the function

$$\int xe^{5x}\,dx.$$

Ignore the arbitrary constant C. Your answer should be in the form $\sum a_n x^n$.

4. (40) For each of the following series, fill in the blank with the letters **CC**, **AC** or **D** depending on whether the given series is conditionally convergent (**CC**), absolutely convergent (**AC**) or divergent (**D**). You must show all work. In particular mention any test that you might use and verify that it is applicable. A correct answer with incorrect work will be considered wrong.

(a) $1 + 1.1 + 1.11 + 1.111 + \cdots$

ANS: _____

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}10^n}{n!}$

ANS: _____

(c) $\dfrac{1}{\ln 2} - \dfrac{1}{\ln 3} + \dfrac{1}{\ln 4} - \dfrac{1}{\ln 5} + \cdots$

ANS: _____

(continued on next page)

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{\sin^3 n}{\pi^n}$

ANS: _____

(e) $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$

ANS: _____

(f) $\displaystyle\frac{1}{2} - \frac{1}{4} + \frac{1}{6} - \frac{1}{8} + \cdots$

ANS: _____

(continued on next page)

(g) $\displaystyle\sum_{n=1}^{\infty} \frac{e^n}{n^3 + 2n}$

ANS: _____

(h) $\displaystyle\sum_{n=2}^{\infty} \frac{n^3 + n + 2}{\sqrt{n^9 - 10}}$

ANS: _____

5. (18) For each of the following statements, fill in the blank with the letters **T** or **F** depending on whether the statement is true or false. You do not need to show your work and no partial credit will be given on this problem.

(a) If the series $\sum_{n=1}^{\infty} a_n$ converges, then the sequence $\{a_n\}$ converges.

ANS: _____

(b) The series $2 - \frac{2}{3} + \frac{2}{9} - \frac{2}{27} + \cdots$ converges to $\frac{3}{2}$.

ANS: _____

(c) Every increasing sequence diverges.

ANS: _____

(continued on next page)

(d) If $\sum_{n=1}^{\infty} a_n$ is a divergent series, then the series $\sum_{n=1}^{\infty} |a_n|$ is divergent.

ANS: _____

(e) $\sqrt{e} = 1 + \frac{1}{2} + \frac{1}{8} + \frac{1}{48} + \cdots$.

ANS: _____

(f) If $\sum_{n=1}^{\infty} a_n$ is a divergent series of positive terms, then some partial sum is $> 10^6$.

ANS: _____

This page is for scratch work.

NAME : _____

SECTION : (circle one) Arkowitz Vatter

Math 8

29 January 2009
Hour Exam I

INSTRUCTIONS: This is a closed book exam and no notes are allowed. You are not to provide or receive help from any outside source during the exam except that you may ask either of the instructors for clarification. You have two hours and you should attempt all problems.

- Wait for signal to begin.
- Print your name in the space provided and circle your instructor's name.
- Sign the FERPA release on the next page only if you wish your exam returned in lecture.
- Calculators or other computing devices are not allowed.
- Except when stated otherwise, you must show your work and justify your assertions to receive full credit.
- There is a blank page at the end for scratch work.

FERPA RELEASE: Because of privacy concerns, we are not allowed to return your graded exams in lecture without your permission. If you wish us to return your exam in lecture, please sign on the line indicated below. Otherwise, you will have to pick your exam up in your instructor's office after the exams have been returned in lecture.

SIGN HERE: _____.

Problem	Points	Score
1	16	
2	13	
3	13	
4	40	
5	18	
Total	100	