MA 114 - Calculus II
PRACTICE
THIRD MIDTERM

Spring 2004
04/13/2004

Name: ______________________ Sec.: ____

SEC.	INSTRUCTORS	T.A.'S	LECTURES	RECITATIONS
001	A. Corso	D. Watson	MWF 8:00-8:50, CP 222	TR 8:00-9:15, CB 347
002	A. Corso	D. Watson	MWF 8:00-8:50, CP 222	TR 12:30-1:45, CP 155
003	A. Corso	S. Petrovic	MWF 8:00-8:50, CP 222	TR 3:30-4:45, CB 347

Answer all of the following questions. Use the backs of the question papers for scratch paper. No books or notes may be used. You may use a calculator. You may not use a calculator which has symbolic manipulation capabilities. When answering these questions, please be sure to:

- check answers when possible,
- clearly indicate your answer and the reasoning used to arrive at that answer (*unsupported answers may receive NO credit*).

QUESTION	SCORE	TOTAL
1.		15
2.		15
3.		15
4.		15
5.		10
6.		10
7.		15
8.		10
Bonus.		5
TOTAL	out of 100 pts	110

1. (5 pts each) Find the limits of the following sequences

$(a)\ a_n = (-1)^n \frac{\sin n}{n};$

$(b)\ a_n = \ln(2n) - \ln(3n+1);$

$(c)\ a_n = \frac{1}{n}\int_1^n \frac{1}{x}dx.$

pts: /15

2. (5 pts each) Determine if the following series converge. If they do, find their sum:

$$(a)\ \sum_{n=2}^{\infty} \frac{\ln n}{n};$$

$$(b)\ \sum_{n=2}^{\infty} \frac{\cos(n\pi)}{5^n};$$

$$(c)\ \sum_{n=1}^{\infty} \frac{1}{4n^2-1}.$$

pts: /15

3. (5 pts each) Determine whether the following series converge or diverge. Give reasons for your answers.

$$(a)\ \sum_{n=1}^{\infty} \frac{n}{n+1};$$

$$(b)\ \sum_{n=1}^{\infty} \frac{n!}{(2n+1)!};$$

$$(c)\ \sum_{n=1}^{\infty} 1+(-1)^n.$$

pts: /15

4. Determine whether the following series converge absolutely, converge conditionally, or diverge. Give reasons for your answers.

$$(a) \ \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^2+2n+1};$$

$$(b) \ \sum_{n=1}^{\infty} (-1)^n \frac{1}{\sqrt{n}}.$$

pts: /15

5. Determine whether the following series converges or not:

$$\sum_{n=1}^{\infty} \frac{1}{n(1+\ln^2 n)}$$

Will it be of any help if you know the behaviour of the improper integral

$$\int_1^{\infty} \frac{dx}{x(1+\ln^2 x)} \ ?$$

Explain....and compute.

pts: /10

6. Determine whether the following statements are true $(\mathbf{T})$ or false $(\mathbf{F})$. Check the appropriate box.

T	**F**	
☐	☐	If $\lim_{n\longrightarrow\infty} a_n = 0$, then the series $\sum_{n=1}^{\infty} a_n$ is certainly convergent.
☐	☐	If $\lim_{n\longrightarrow\infty} a_n = 1/2$, then the series $\sum_{n=1}^{\infty} a_n$ is divergent.
☐	☐	The series $\sum_{n=1}^{\infty} 3^n$ is convergent.
☐	☐	The series $\sum_{n=1}^{\infty} 3^{-n}$ is divergent.
☐	☐	If a series converges then it converges absolutely.

pts: /10

7. (a) (5 pts) Find the interval of convergence of the following power series

$$\sum_{n=1}^{\infty} \sqrt[n]{n}(x-5)^n.$$

(b) (10 pts) Find the series' interval of convergence and, within this interval, the sum $f(x)$ of the series

$$\sum_{n=1}^{\infty} \frac{(x+1)^{2n}}{9^n} = \underline{\hspace{6cm}}.$$

pts: /15

8. Find a power series representation for the function $f(x) = \ln(1+x)$ and determine the radius of convergence.

pts: /10

Bonus. Use series to evaluate the limit

$$\lim_{x \longrightarrow 0} \frac{1 - \cos x}{1 + x - e^x} = \underline{\hspace{3cm}}.$$

Why not check up all your work?

pts: /5