Math 104-004 Rimmer
Exam # 4 Fall 2015

First and Last Name _____(PRINT) Penn ID_____

Recitation **(circle one):**

T 8:30 201	T 9:30 202	Th 8:30 203	Th 9:30 204	**Rebecca**
T 8:30 205	T 9:30 206	Th 8:30 207	Th 9:30 208	**Kiet**

This exam has 2 multiple choice questions and 5 open-ended question. Each question is worth 10 points for a total of 70 points. On the questions with multiple parts, the points will be split equally. Partial credit will be given for the entire exam so be sure to show all work. Circle the correct answer and give supporting work, a correct answer with little or no supporting work will receive little or no credit. Use the space provided to show all work. A sheet of scrap paper is provided at the end of the exam. If you write on the back of any page please indicate this in some way.

You have **50 minutes** to complete the exam. You are not allowed the use of a calculator or any other electronic device. You are allowed to use the front and back of a standard 8.5"X11" sheet of paper for handwritten notes. Please silence and put away all cell phones and other electronic devices. When you finish, please stay seated until the entire 50 minutes has elapsed. When time is up, continue to stay seated until someone comes by to collect your exam and announces that you may leave.

Once you have completed the exam, sign the academic integrity statement below.
Do **NOT** write in the grid below. It is for grading purposes only.

Problem	Points
1	
2	
3	
4	
5	
6	
7	
Total	

My signature below certifies that I have complied with the University of Pennsylvania's Code of Academic Integrity in completing this examination paper.

_____
Name (printed)

_____
Signature

1.

Determine whether the following series converges or diverges.

I. $\sum_{n=1}^{\infty} \frac{n(n+3)}{(n+1)(n+5)(n+11)}$

II. $\sum_{n=1}^{\infty} \left(\frac{n}{n+1} \right)^{n^2}$

2.

Determine whether the following series converges or diverges.

I. $\sum_{n=2}^{\infty} \frac{(2n)!}{3^{n^2}}$

II. $\sum_{n=2}^{\infty} \frac{1}{n(\ln n)^{4/3}}$

3.

Determine whether the following series is absolutley convergent, conditionally convergent or divergent.

I. $\sum_{n=2}^{\infty} \frac{(-1)^n}{n^{e/\pi}}$

II. $\sum_{n=1}^{\infty} \frac{(-3)^n}{(\ln 2)^{n+1}}$

4. The interval of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{(n+3)(3x-1)^n}{3^n n^3}$$

a) $\left(\frac{-2}{3}, \frac{4}{3}\right]$

b) $\left[\frac{-2}{3}, \frac{4}{3}\right]$

c) $\left(\frac{-2}{3}, \frac{4}{3}\right)$

d) $\left[\frac{-4}{3}, \frac{2}{3}\right)$

e) $\left(\frac{-4}{3}, \frac{2}{3}\right]$

f) $\left[\frac{-4}{3}, \frac{2}{3}\right]$

g) $\left\{\frac{-1}{3}\right\}$

h) $(-\infty, \infty)$

5. Find the quadratic Taylor polynomial for $f\left(x\right)=\sqrt{x^2+9}$ centered at $x=4$.

6. Find the first three nonzero terms in the Maclaurin series for

$$f(x)=\frac{xe^{x}}{\ln(1+x)}.$$

7. Find the sum of each series

$$L=\sum_{n=1}^{\infty}\frac{(-1)^{n-1}\,n}{2^{n-1}}$$

$$M=1-\ln 9+\frac{(\ln 9)^2}{2!}-\frac{(\ln 9)^3}{3!}+\cdots$$

and then calculate $\frac{L}{M}$.

a) 1

b) 2

c) 3

d) 4

e) 5

f) 6

g) 7

h) One of the series diverges

Scrap Paper

If you use this page and intend for me to look at it, then you must indicate so on the page with the original problem on it. Make sure you label your work with the corresponding problem number.

Do **NOT** rip this page off.