

Math 126
Exam 1
October 20, 2006

Name: _____

1. Your exam contains 5 questions and 5 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values for problems vary and these are clearly indicated. You have 50 minutes for this exam.
3. Make sure to ALWAYS SHOW YOUR WORK; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, use the back page of the exam and clearly indicate this.
5. You are allowed one 8.5×11 sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.

Problem	Total Points	Score
1	30	
2	20	
3	15	
4	15	
5	20	
Total	100	

1. (30 pts.) Are the following series convergent or divergent? Justify your answers.

(a) (10 pts.) $\sum_{n=1}^{\infty} (-1)^n \cos\left(\frac{\pi}{n}\right)$

(b) (10 pts.) $\sum_{n=0}^{\infty} \frac{(-2)^{n+1}}{5^n}$

(c) (10 pts.) $\sum_{n=0}^{\infty} \frac{1}{2^n - n^2}$

2. (20 pts.) Consider the sequence $\{a_n\}$ with $a_n = \frac{(3n)^n}{n^{3n}}$.

(a) (10 pts.) Determine and prove whether the sequence $\{a_n\}$ converges or diverges. If it converges, find the limit.

(b) (10 pts.) Determine and prove whether the series $\sum_{n=1}^{\infty} a_n$ converges or diverges.

3. (15 pts.) Find the radius of convergence and the interval of convergence of the series $\sum_{n=1}^{\infty} \frac{(4x-1)^n}{n^2}$.

4. (15 pts.) If the n th partial sum of a series $\sum_{n=1}^{\infty} a_n$ is $s_n = \frac{3n+2}{n}$, find a_n (for all n) and $\sum_{n=1}^{\infty} a_n$.

5. (20 pts.)

(a) (10 pts.) Find a power series representation for the function $f(x) = \frac{4}{x-2}$ and determine the radius of convergence.

(b) (10 pts.) Find a power series representation for the function $g(x) = \frac{4}{(x-2)^2}$ and determine the radius of convergence.