MATH 16C:
TEST 3

SPRING 2007

Name	
I.D. Number	

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

(1) Consider the following sequence:

$$a_n = \frac{\cos(3n^2 + 2n - 1)}{4n - 2}.$$

a) Evaluate the following limit

$$\lim_{n\to\infty} a_n.$$

b) Based only on your result in part a), what can you say about the convergence of the series

$$\sum_{n=0}^{\infty} a_n$$

Explain your answer.

(2) Consider the following series

$$\sum_{n=3}^{\infty} 2\left(-\frac{3}{7}\right)^n.$$

a) Does the series above converge? Why or why not?

b) If it converges, what is it's value?

c) What is the value of the N-th partial sum

$$S_N = \sum_{n=0}^{N} 2\left(-\frac{3}{7}\right)^n \qquad ?$$

(3) Determine whether or not the following series converge. Give reasons for your answer.

a)

$$\sum_{n=1}^{\infty} \frac{1}{n^{\frac{\pi^2}{9}}}$$

b)

$$\sum_{n=1}^{\infty} \frac{(n+1)\,9^n}{n\,7^{2n}}$$

c)

$$\sum_{n=1}^{\infty} \frac{(2n+5)!}{(3n)!\,10^n}.$$

(4) Consider the function

$$f(x) = \sqrt[5]{x+2}.$$

a) Find the Taylor series for this function centered at -1.

b) What is the radius of convergence for this power series?

(5) Using the Maclaurin series for $\sin(x)$,

$$\sin(x) = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!},$$

find the Taylor polynomial (centered at 0) with degree 13 for

$$f(x) = \frac{3\sin(2x^2)}{5x}.$$