Math 222
Midterm Exam

Prof. Beck
November 10, 2005

Name: ______________________________

TA: ______________________________

Problem	Score
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

1. Each triangle in the descending chain (Figure 5) has its vertices at the midpoints of the sides of the next larger one. If the indicated pattern of painting is continued indefinitely, what fraction of the original triangle will be painted? Does the original triangle need to be equilateral for this to be true?

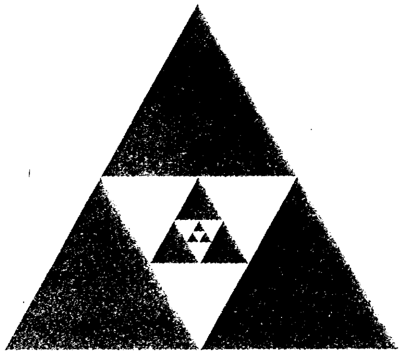

Figure 5

2. Use any test to determine convergence. State the test.

$$\sum_{k=1}^{\infty} \frac{\tan^{-1} k}{1 + k^2}$$

3. Determine convergence or divergence for this series. Indicate the test you use.

$$\sum_{n=1}^{\infty} \frac{4n^3 + 3n}{n^5 - 4n^2 + 1}$$

4. Classify each series as absolutely convergent, conditionally convergent, or divergent.

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

5. For which values of x does this series converge? For which does it converge absolutely?

$$1 + \frac{x+1}{2} + \frac{(x+1)^2}{2^2} + \frac{(x+1)^3}{2^3} + \cdots$$

6. State and prove the integral test for convergence for this series.

7. Find the first five terms of the Maclaurin series.

$$f(x) = \tan x$$

8. Find the first five terms of the Maclaurin series.

$$f(x) = \sin^3 x$$

9. Expand $\frac{1}{x}$ in a Taylor series about 3.

10. Sum:

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