Math 22: Unit 3 Exam

Spring Semester 2006

Instructions. Read each problem carefully and follow all of its instructions. For each of the problems below, write a clear and concise solution in your blue book. For any short answer questions, write clearly your answer and any additional explanation that is needed.

1. (10 points) Use the limit comparison test to determine whether or not $\sum_{n=1}^{\infty} \frac{3n^3}{n^4+n^3+4}$ converges or diverges.

2. (10 points) What is the radius of convergence for $\sum_{n=0}^{\infty} \frac{n}{5^n}(2x-1)^n$?

3. (5 points) Suppose a function f satisfies $f(2) = 4$, $f'(2) = 3$, $f''(2) = -5$, and $f'''(2) = 12$. What is the third degree Taylor polynomial for f about $x = 2$?

4. (5 points) Use the integral test to determine whether or not the series $\sum_{n=1}^{\infty} \frac{2n}{(n^2+1)^3}$ converges.

5. For the series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2n^2}$,

   (a) (5 points) Use the alternating series test to determine whether or not this series converges.

   (b) (5 points) Is this series absolutely convergent? Explain why or why not.

6. (5 points) Find the exact value for $\sum_{n=0}^{\infty} \frac{2+4^n}{5^n}$.

7. (5 points) Use the Taylor series of $\cos x$ about $x = 0$ to determine $\lim_{x\to 0} \frac{1-\cos x}{x^2}$.