Exam Instructions for verifying convergence tests

3. Use the p-series test ("Example 2, 11.3") to determine ... State explicitly the value of p for each series, and why that value passes or fails this convergence test.

4. For each of the given series, either use the ratio test to decide whether the series converges or diverges, or state that the ratio test is inconclusive. In each case, state clearly what ratio you're computing, and give the limiting ratio L. Include as much information as you can about how you compute the limiting ratio L.

5. Use limit comparison to determine ... State clearly which series $\sum c_n$ or $\sum d_n$ you use for the comparison; how you know that your series (the c_n or d_n) converges or diverges; and give the value of the limit needed to make the comparison.

6. Use the comparison test to show ... Give an explicit inequality relating the terms of your comparison series and verify that the inequality you give holds (for all positive integers n).

Previous Exam Questions (for Practice)

2. (*7 points*) Find all x for which the series below converges. Find all x for which the series diverges. When the series converges, determine whether the convergence is absolute or conditional. Show your results in a diagram.

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

2. (*40 points*) Determine whether the given series converges absolutely, converges conditionally, or diverges. Explain clearly any comparisons you make, and why any test you use can be applied.

(a) $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^k k^{2k}}{(3k)!}.$

(b) $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^k 5^k}{k^2}.$

4. (*30 points*) Find the radius of convergence of the given series, and the set of points for which it converges. Find the set of points for which the series diverges. When the series converges, determine whether the convergence is absolute or conditional.

(a) $\displaystyle\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k}}{4^k}.$

(b) $\displaystyle\sum_{k=0}^{\infty} \frac{(-1)^k (3x+1)^k}{\sqrt{k}}.$