My Office Hours: M & W 2:30–4:00, Tu 2:00–3:30, & F 1:30–2:30 or by appointment. **Math Intern:** Sun: 2:00–5:00, 7:00–10pm; Mon thru Thu: 3:00–5:30 and 7:00–10:30pm in Lansing 310. Website: `http://math.hws.edu/~mitchell/Math131F15/index.html`.

☕ *Practice.*

1. (*a*) For the moment, skip section 91. Read Section 9.2 on Power series, through page 679.

(*b*) **Review** Section 8.6 on Alternating Series. Skip the subsection on remainders. But do read pages 654–655 on Absolute Convergence. You should know the definitions of **Absolute** and **Conditional Convergence**.

(*c*) Review the nice summary chart on page 656. It is a great guide.

2. Basics: Page 657 #15, 17, and 21. More interesting: Page 585 #25 and 27.

3. Do you understand the difference between absolute and conditional convergence: Page 657 #47, 49, 53, and 55.

1. The Alternating Series Test. Assume $a_n > 0$. The alternating series $\sum_{n=1}^{\infty}(-1)^n a_n$ converges if the following two conditions hold:

(*a*) The terms a_n are (eventually) decreasing (non-increasing), that is, $a_{n+1} \leq a_n$ for all n (or for all $n > N$).

(*b*) $\lim_{n\to\infty} a_n = 0$

2. Absolute Convergence Test. If the series $\sum_{n=1}^{\infty} |a_n|$ converges, then so does the series $\sum_{n=1}^{\infty} a_n$.

3. The Ratio Test Extension. Assume that $\sum_{n=1}^{\infty} a_n$ is a series with **non-zero** terms and let $r = \lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right|$.

1. If $r < 1$, then the series $\sum_{n=1}^{\infty} a_n$ converges *absolutely*.
2. If $r > 1$ (including ∞), then the series $\sum_{n=1}^{\infty} a_n$ diverges.
3. If $r = 1$, then the test is inconclusive. The series may converge or diverge.

☞ This test is most helpful when the series diverges. It says we can check for absolute convergence and if we find the absolute value series diverges, then the original series diverges. We don't have to check for conditional convergence. Huzzah!

Hand In

0. WeBWorK Day 38 (due Tuesday) and WeBWorK Day 39 (due Wednesday).

1. Determine whether the following series converge conditionally, absolutely, or not at all. What strategy may save you work? Complete arguments.

(*a*) $\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt[3]{n^4+1}}$ (*b*) $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{\sqrt{n+10}}$ (*c*) $\sum_{n=1}^{\infty} \frac{(-7)^{n+1}}{n!}$

2. (*a*) Page 657 #54. Justify your answer to this and the next part.

(*b*) Does $\sum_{n=1}^{\infty} (-1)^n \frac{(n!)^3}{(3n)!}$ converges conditionally, absolutely, or not at all?