

Will's Guide To Life, Volume 2

Math 231

Spring 2008

Section 8.1

The idea of an infinite sequence. Convergence and divergence of sequences, in particular note that sequences can diverge to infinity or diverge by oscillation. Using the “Squeeze Theorem” to find limits. Representing a sequence as a function from the whole numbers to the real numbers. L'Hôpital's Rule for sequences, and how to use it and why it doesn't apply to sequences directly. The definition of convergence for a sequence (ϵ and N). Bounded and monotonic sequences and how to show a sequence is bounded or monotonic.

Section 8.2

Infinite series, make sure you remember the difference and connection between sequences and series. The limit of partial sums to find the sum of an infinite series. The geometric series, $\sum_{n=0}^{\infty} ar^n$ and the harmonic series $\sum_{n=1}^{\infty} \frac{1}{n}$. The geometric series converge to $\frac{a}{1-r}$ if $|r| < 1$, the harmonic series diverges. The k^{th} Term Test for Divergence, what it tells us, what it doesn't tell us.

Section 8.3

The Integral Test, given a decreasing, positive term series and a function, $f(n) = a_n$, where a_n is the n^{th} term in the series. How we can relate the convergence or divergence of the infinite series $\sum_{n=1}^{\infty} a_n$ to the convergence or divergence of the improper integral $\int_1^{\infty} f(x)dx$. The p -Series, $\sum_{n=1}^{\infty} \frac{1}{n^p}$, converges for $p > 1$, diverges for $p \leq 1$. Comparison Test for Positive Term Series. Compare a series to a known series such as a geometric series or p -Series term-by-term to see if it converges or diverges. Limit Comparison Test, using limits (what a series “looks

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like" for large n) and a known series to determine whether a series converges or diverges.

Section 8.4

Alternating Series, a positive term series with a $(-1)^n$ thrown in to make it alternate about zero. The Alternating Series Test, a decreasing series that approaches zero as n approaches infinity converges, but we do not know from this test whether it is absolutely or conditionally convergent.

Section 8.5

The difference between absolute convergence and conditional convergence, always remembering to look at the series of absolute values. If the series of absolute values converges, the series converges absolutely. Ratio and Root Tests. What the different values of the limit L tell us, particularly that $L = 1$ tells us nothing.

Section 8.6

Power Series. The definition of a power series, and the idea of a Radius of Convergence and Interval of Convergence. Finding the Interval of Convergence by setting up a Ratio Test and setting it less than 1, then checking our endpoints to see if the series will converge there. Integrating and differentiating power series term-by-term when we are in the interval of convergence.