Will's Guide To Life, Volume 2

Math 230, Fall 2005

1 Section 10.2

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.

2 Section 10.3

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

3 Section 10.4

The Taylor Series, Taylor Polynomials and Remainder Terms. Building these from derivatives of the function we're given and powers of $(x - a)$. Taylor Series as the limit as n goes to infinity of the n^{th} Taylor Polynomial. Make sure you know the Taylor Series for e^x, $\cos x$ and $\sin x$. Euler's Formula, $e^{i\theta} = \cos\theta + i\sin\theta$. In particular its use in deriving trigonometric identities.

4 Section 10.5

The Integral Test, given a 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 $p \leq 1$.

5 Section 10.6

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

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diverges. Limit Comparison Test, using limits and a known series to determine whether a series converges or diverges.

6 Section 10.7

Alternating Series, a positive term series with a $(-1)^{n+1}$ 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. 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 ρ tell us, particularly that $\rho = 1$ tells us nothing.

7 Section 10.8

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. The idea that Taylor Series are Power Series. The Binomial Theorem for integral exponents and Binomial Series for non-integral exponents. Integrating and differentiating power series term-by-term when we are in the interval of convergence. Know the power series of e^x,$\cos x$, $\sin x$ and $\frac{1}{1+x}$.

8 Section 10.9

Using power series to estimate functions to a reasonable degree. Using Power Series to do definate integration of non-integrable functions. Addition and multiplication of power series.

For more detailed information on these topics, please go to:
https://netfiles.uiuc.edu/wgreen4/www