
Approximate List of Topics:

- **Sequences** Convergence and divergence - what they mean. The mathematical definition of a limit. What it means to go to infinity.
- Testing for convergence: squeeze theorem, monotone sequence theorem, geometric sequences.
- Different ways to write down sequences (explicit, recursive, etc).
- Finding limits: plugging in continuous functions, L'Hopital's rule. Limits of recursive sequences.
- **Series** Convergence and divergence - what they mean. The difference between a sequence and a series.
- Geometric series and p -series.
- Testing for convergence: telescoping sums, the "test for divergence," the ratio test.
- Series with positive entries: the integral test, the comparison test, the limit comparison test.
- Series with positive and negative entries: definition of absolute convergence, the absolute convergence test, the alternating series test.
- Remainder estimates: for integral test, and for alternating series test.
- **Power Series** Finding the radius of convergence (using the ratio test). Finding the interval of convergence (using other tests on the boundary).
- Manipulation of power series: addition, multiplication, derivatives, integrals. Using the geometric series.
- Using power series and series bounding methods to estimate values and integrals.
- **Taylor Series** Understanding what it means to approximate a function around a point c to degree k .
- The Taylor series at 0 for common functions: $\frac{1}{1-x}$, $\ln(x+1)$, $\sin x$, $\cos x$, e^x , $\arctan(x)$, $(1+x)^k$.
- Recognizing these common power series when evaluated.
- Computing derivatives to compute the Taylor series around any point, or to compute the k -th order approximation.
- Taylor's inequality estimate!!!!!!!!!!!!!!
- Proving that a Taylor series converges to a function.
- **Ordinary Differential Equations** What an ODE looks like. What an initial value is.
- Finding particular power series solutions to ODEs with initial value. Finding general power series solutions to ODEs centered at a given point.