Exam 3: What you should be able to do

The material of Chapter 11 involves more logical reasoning than any other chapter of the book. It is important to show the reasoning you used to arrive at your answers.

The numbers in parentheses indicate the sections where such problems, and methods of solution, are found.

- Given a sequence $a_n = \dots$, find its limit or state that the limit does not exist. (1)
- Given a series, determine if it is convergent or divergent. Find the sum if it is convergent. (2)

  Note: We can only find the sum of geometric and telescoping series.
- Given a series, determine if it is convergent or divergent. (2–7)
- Given a series, determine if it is absolutely convergent, conditionally convergent, or divergent. (2–7)

  Note: This may involve two tests: one for the series $\sum a_n$ itself, one for $\sum |a_n|$.
- Use the Remainder Estimate for alternating series. (5)

  Note: Remainder Estimate works in two ways. (a) Given the number of terms in the partial sum, estimate the remainder (=error of approximation). (b) Given how small the error should be, find how many terms should be in the partial sum.
- Given a power series, find its Radius of Convergence and Interval of Convergence. (8)

  Note: Find the RoC from the Ratio Test. Then use other tests for endpoints of IoC to find if they are included in the IoC.
- Given a function, find its power series representation. (9)

  Note: it all begins with $\dfrac{1}{1-x} = \sum_{n=0}^{\infty} x^n$. *There is another method in (10), but (10) is not on Exam 3.*
- Use the power series representation of a function to integrate the function. (9)

  Note: Since n is not the variable of integration, it should be treated as a constant. If the integral is definite, plug in the limits of integration at the end.