Math 262
Exam 4 Review Sheet

Section 10.1 Sequences

• Understand the definition of a sequence, and the notation used to represent sequences and their terms.
• Understand what it means for a sequence to be convergent and what it means for a sequence to be divergent.
• Be able to use limits to investigate the convergence/divergence of sequences.
• Know the definition of a monotone sequence and the definition of a bounded sequence. Recall the fact that every bounded monotonic sequence has a limit.
• Be able to use the sandwich theorem to show that a sequence has a limit.

Section 10.2 Infinite Series

• Understand the definition of an infinite series and the notation used to represent infinite series and their terms.
• Understand and be able to distinguish between the two sequences associated with a given series: the sequences of terms $\{a_n\}$ and the sequence of partial sums $\{S_n\}$.
• Know how to determine whether a telescoping series converges or diverges and when it converges, find its sum.
• Know how to determine whether a geometric series converges or diverges and when it converges, find its sum.
• Understand the proof that the harmonic series diverges.
• Understand and be able to apply the nth term test show that a given series diverges. Also remember that this test **cannot** be used to show that a series converges.
• Understand and be able to apply the theorems about series that are *eventually equal*, and about the effects of addition, subtraction, and scalar multiplication on convergent and divergent series.

Section 10.3 and 10.4 Positive Term Series

• Understand the definition of a positive term series.
• Understand and be able to apply the Integral Test to investigate the convergence/divergence of a given series. In particular, remember to verify the hypotheses needed to use this test.
• Memorize the theorem on p-series and thus be able to determine whether a given p-series converges or diverges.
• Understand and be able to apply the (Basic) Comparison Test to investigate the convergence/divergence of a given series. In particular, remember to verify the inequalities needed to use this test.
• Understand and be able to apply the Limit Comparison Test to investigate the convergence/divergence of a given series. In particular, remember to conditions that allow us to detect convergence/divergence and those that lead this test to be inconclusive.

Section 10.5 The Ratio and Root Tests.

• Understand and be able to apply the Ratio Test to investigate the convergence/divergence of a given series. In particular, remember to conditions that allow us to detect convergence/divergence and those that lead this test to be inconclusive.
• Understand and be able to apply the Root Test to investigate the convergence/divergence of a given series. In particular, remember to conditions that allow us to detect convergence/divergence and those that lead this test to be inconclusive.

Section 10.6 Alternating Series, Absolute and Conditional Convergence

• Understand the definition of an alternating series.
• Understand and be able to apply the Alternating Series Test to investigate the convergence/divergence of an alternating series. In particular, remember to verify the hypotheses needed to use this test.
• Understand how to find a bound on the error in approximating the sum of a convergent alternating series by looking at the $n+1$st term.
• Understand the definition of an absolutely convergent series and remember that if an alternating series is absolutely convergent, then it converges.
• Given an alternating series, be able to determine whether it converges absolutely, conditionally, or diverges.
• Be able to show that an alternating series is absolutely convergent by using the ratio test.

Section 10.7 Power Series

• Know the definition of a power series centered at zero, or at some other number a.
• Be able to find the radius of convergence for a power series by using either the Ratio Test of the Root Test.
• Be able to find the interval of convergence (including endpoints) for a given power series.
• Be able to perform operations on power series (addition, subtraction, multiplication, term-by-term differentiation, term-by-term integration).