

Exam 4 Objectives

For Exam #4, a well-prepared student should be able to

- use informal reasoning to make a conjecture and then build a rigorous argument to justify a final conclusion on whether a given thing (improper integral, sequence, series) converges or diverges
- determine whether a given improper integral converges or diverges, and if it converges, determine the value
- interpret an improper integral (for example, as area of an unbounded region or as accumulation over an unbounded interval of time)
- give informal definitions of *sequence*, *series*, and *power series*
- state basic rules and results for convergence of sequences
- determine whether a given sequences converges or diverges and, if it converges, determine the limit
- distinguish between the sequence of terms and the sequence of partial sums for a given series
- state basic rules and results for convergence of series (including p -series and geometric series)
- compute the sum of a given convergent geometric series
- state a comparison (direct or limit) argument to support a claim that a given series converges or diverges
- use the ratio test to analyze the convergence of a given series
- use the alternating series theorem to analyze the convergence of a given alternating series
- determine if a given series converges absolutely, converges conditionally, or diverges and give an argument to support the conclusion
- determine the interval of convergence for a given power series
- differentiate or integrate a given power series
- construct a Taylor polynomial or Taylor series for a given function based at a given point
- find a power series representation for a given function by directly computing a Taylor series or by relating to a known power series representation
- use a Taylor polynomial to approximate the value of a function for a given input
- use power series representations to deduce/prove facts about functions
- state Euler's formula and use Euler's formula in simple ways