Math 2300
Exam 2 topics

The exam will cover sections 6.6, 8.1, 8.2, 8.3, and 8.4. Here is a list of topics that you should have mastered for the exam:

- For any of the applications given below, be able to write the integral first as a limit of a Riemann sum. The Riemann sum gives an approximation of the quantity we're trying to find, calculated by slicing the object up, calculating the desired quantity for that single slice, then adding.

- Be able to apply the concept of integration to various physical contexts, and explain its meaning.

- Be able to find the mass and center of mass of a wire (or rod) of given length with either a constant or variable density function (density in this case is measured in mass per unit length).

- Be able to find the mass and center of mass of a region in the plane (or lamina) with either a constant or variable density function (density in this case is measured in mass per unit area). The density function may be a function of x or a function of y, you must know which direction to slice the region in either case. Know how to find the center of mass in one dimension using symmetry, and in the other direction by calculating integrals.

- Know how to find a formula that matches a given sequence, including when the sequence alternates signs, when it contains components that are arithmetic (linear) and geometric (exponential) and factorial and other recognizable cases (such as perfect squares).

- Be able to determine if a sequence converges or diverges by taking a limit.

- Understand how to graph a sequence a interpret the graph of a sequence.

- Be able to find a formula that matches a given series, and write it in sigma-notation.

- Be able to expand a series that is written in sigma-notation.

- Recognize infinite geometric series (written in either expanded or sigma-notation), know how to tell whether they converge or diverge, and how to calculate their sums if they do converge. Also be able to calculate the sum of any finite geometric series.

- Recognize when an applied problem corresponds to a geometric series, write the series in either expanded or sigma-notation.

- Know what it means for an infinite series to converge or diverge.

- Know how to show that a series with *positive* terms satisfies the conditions for the following tests, and how to apply the tests to determine whether or not a series converges:

  - The divergence test
  - The geometric series test
  - The comparison test
  - The limit comparison test
  - p-series
  - The integral test

- Know how to show that a alternating series satisfies the conditions for the following tests, and how to apply the tests to determine whether or not an alternating series converges:

  - The alternating series test.
  - The ratio test.

- Be able to recognize, show, and discuss that a series is absolutely convergent, conditionally convergent, or divergent.

- Be able to calculate the estimate the error (remainder) for the alternating series test.