A List of Topics for the First Midterm

Here's what you should be able to do for the midterm next week.

1. Riemann sums

   (a) Compute L_n, R_n, and M_n estimates for areas under curves.

   (b) Write the (exact) area under a curve as a limit of Riemann sums and (for certain curves) evaluate that limit.

   (c) Recognize such a limit, convert it to an integral, and compute it.

2. Integration

   (a) Find antiderivatives of certain elementary functions including polynomials, exponential functions, and certain trigonometric functions.

   (b) Use u-substitution to evaluate more challenging integrals.

   (c) Compute indefinite integrals and definite integrals.

   (d) Evaluate integrals of odd or even functions on intervals of the form $[-a, a]$.

   (e) Use the fundamental theorem of calculus to differentiate functions that are defined in terms of integrals.

3. Applications

   (a) Given velocity or acceleration, compute the net displacement of an object over a time interval *or* compute its total distance traveled.

   (b) Find the area bounded by two or more curves in the plane.

   (c) Compute the volumes of solids by integrating their cross-sectional areas.

   (d) In particular, use the washer method for finding volumes of solids of revolution by integrating along the axis of rotation.