

Exam #4 objectives

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

- use cartesian or polar coordinates to describe points, curves, and regions in the plane (including transforming from one coordinate system to another if needed)
- use cartesian, cylindrical, or spherical coordinates to describe points, surfaces, and regions in space (including transforming from one coordinate system to another if needed)
- articulate an intuitive and fundamental meaning for each type of integral we have studied
- state and use basic properties of double and triple integrals
- state and apply Fubini's Theorem
- give a geometric argument for the area element in polar coordinates
- give a geometric argument for the volume element in cylindrical coordinates and in spherical coordinates
- set up an iterated integral (in a chosen or specified coordinate system) equal to a double integral for a given function and given region in the plane
- set up an iterated integral (in a chosen or specified coordinate system) equal to a triple integral for a given function and given region in space
- evaluate a given iterated integral
- construct and evaluate an integral to compute the area of a planar region
- construct and evaluate an integral to compute the volume of a solid region
- construct and evaluate an integral to compute the total for some quantity given a region and a density for that quantity
- construct and evaluate an integral to compute the average value of a function for a given domain
- set up a definite integral equal to a curve integral for a given function and a given curve in the plane or in space
- construct and evaluate an integral to compute the length of a given curve
- construct and evaluate an integral to compute the total for some quantity given a curve and a length density along that curve