MAT 271   Course Objectives

Calculus with Analytic Geometry II

The Substitution Rule Apply the substitution rule to evaluate certain integrals.

Integration by Parts Evaluate certain integrals using integration by parts.

Trigonometric Integrals Evaluate integrals involving trigonometric functions

Trigonometric Substitutions Perform trig substitutions where applicable and then evaluate such integrals.

Partial Fractions Rewrite a rational function in terms of a partial fraction decomposition and then evaluate such integrals.

Improper Integrals Identify improper integrals of various types and evaluate.

Velocity and Net Change Given a position function, be able to find velocity, acceleration, and, over time, a net change.

Regions Between Curves Be able to sketch regions between curves, find points of intersection if need be, and compute the area between those curves.

Volume by Slicing Find the volume of a solid using slices and Riemann sums to get integrals representing said volume and compute it. Especially be able to find the volume of solids of revolution.

Volume by Shells Find the volume of certain solids of revolution specifically using cylindrical shells.

Lengths of Curves Find the arc length of a curve from one point to another. Compute arc lengths exactly when possible (and via calculator or computer software if impossible to integrate without).

Physical Applications

- Find the mass of a one-dimensional object given a density function.
- Find work given a force applied to an object moving along a line.
- Find work stretching a spring using Hookes Law
- Find work required to pump water or another fluid out of a tank.

Sequenes

- Find terms of a sequence by a pattern, a specified function or a recurrence relation.
- Find the limit of a sequence if it exists.

Introduction to Infinite Series Find the sum of Geometric Series and Telescoping Series

The Divergence and Integral Tests

- Apply the divergence and integral tests to determine convergence of a given series.
- Also be able to estimate the error.
- Compute p-series that converge.

The Ratio, Root and Comparison Tests Apply the ration, root and comparisons tests to test if a given series converges or not.

Alternating Series

- Apply the alternating series test to alternating series to test for converge. -
- Also be able to estimate the error of a partial sum.

Approximating Functions with Polynomials Approximate functions with linear functions, quadratic polynomials etc.

Taylor polynomials. Approximate the error when using Taylor polynomials to approximate a function.

Properties of Power Series

- Determine convergence of power series when possible
- Combine power series to get new ones.
- Differentiate and integrate power series and corresponding functions.

Taylor Series Compute Taylor and Maclauren series for a given function including binomial series.

Working with Taylor Series Differentiate and integrate Taylor series to get new ones.

Parametric Equations Work with parameterized curves. Also be able to find derivatives and arc length of such.

Polar Coordinates Be able to convert equations and points in Cartesian coordinates back and forth to polar coordinates.

Calculus in Polar Coordinates Find derivatives, areas and arc lengths of polar curves or regions bounded by them.