

Tentative Weekly Schedule: Calculus with Review I, Autumn 2017

Week 1:

Calculus is expressed in the language of functions. In the first week we introduce functions, both analytically and graphically. Then we introduce limits both graphically and through tables of values.

Precalculus Emphasis: Functions, domains, ranges, graphs of functions, inverse functions, inequalities

Week 2:

After finding deficiencies in estimating limits through a table of values, we find algebra necessary so that we can calculate analytically. We study polynomial and rational functions which frequently arise in these calculations.

Precalculus Emphasis: Multiplying and factoring polynomials, solving polynomial equations, graphing polynomials, adding rational expressions, simplifying fractions, finding asymptotes

Week 3:

We return to limits and discuss the Limit Laws and the Squeeze theorem as methods of explicitly calculating their values.

Precalculus Emphasis: Polynomials, rational functions, radicals, inequalities

Week 4:

We introduce the notion of the "Form" of a limit, and talk about basic indeterminate forms. Then we look at places where the limit values increase/decrease without bound, yielding vertical asymptotes.

Precalculus Emphasis: Simplifying rational expressions, simplifying algebraic expressions, factoring

Week 5:

We turn from vertical to horizontal and slant asymptotes. We then move on to continuity and how it can allow us to calculate limits more effectively.

Precalculus Emphasis: Dividing polynomials, simplifying algebraic expressions, piecewise-defined functions

Week 6:

This is the week of the first midterm. We will review for the midterm, then talk about average and instantaneous velocity, including how to compute it as an application of limits.

Precalculus Emphasis: Equations of lines, slopes, average velocity, simplifying rational expressions, simplifying algebraic expressions

Week 7:

We introduce the derivative as the slope of the tangent line to a graph at a point, then see that as the point moves along the curve, it gives a function.

Precalculus Emphasis: Simplifying rational expressions, simplifying algebraic expressions

Week 8:

Week 8 is a short week, due to Fall Break. We start developing formulas for finding derivatives.

Precalculus Emphasis: Multiplying polynomials, simplifying rational expressions

Week 9:

We develop more derivative formulas: the Product Rule, the Quotient Rule, and the Chain Rule.

Precalculus Emphasis: Multiplying expressions, simplifying algebraic expressions, function composition

Week 10:

We have our second midterm during week 10. We will spend time reviewing, and then discuss exponential and logarithmic functions.

Precalculus Emphasis: Inverse functions, exponential functions, logarithmic functions

Week 11:

We find formulas for the derivative of exponential functions and logarithmic functions. We then introduce higher derivatives and see how they affect the increasing/decreasing behavior of a function as well as its concavity.

Precalculus Emphasis: Exponential functions, logarithmic functions, inequalities, graphs of functions

Week 12:

We cover trigonometric functions and their derivatives.

Precalculus Emphasis: Trigonometry

Week 13:

We discuss local and global extrema, critical points, and inflection points. We then review for our third midterm.

Precalculus Emphasis: Solving equations, Inequalities

Week 14:

Week 14 is the week of Thanksgiving, so it is a short week. We cover the Mean Value Theorem.

Precalculus Emphasis: Solving equations

Week 15:

We discuss an application of derivatives, optimization problems.

Precalculus Emphasis: Solving formulas