MIT ESP Delve 2011-2012

AP Calculus AB

Teachers

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Prerequisites

Those outlined by the College Board at http://www.collegeboard.com/student/testing/ap/sub_calab.html?calcab

"Before studying calculus, all students should complete four years of secondary mathematics designed for college-bound students: courses in which they study algebra, geometry, trigonometry, analytic geometry, and elementary functions. These functions include those that are linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric, and piecewise defined. In particular, before studying calculus, students must be familiar with the properties of functions, the algebra of functions, and the graphs of functions. Students must also understand the language of functions (domain and range, odd and even, periodic, symmetry, zeros, intercepts, and so on) and know the values of the trigonometric functions of the numbers 0, pi/6, pi/4, pi/3, pi/2, and their multiples."

Homework

Problem sets and their solutions will be provided, but will not be collected. It is expected that you complete the problem set and then check your solutions. If anything is still unclear after the solutions have been posted then you should ask us for help.

Quizzes

Every class will have 1-2 very short quizzes; they will last no longer than 15 minutes each. We will use these to assess the class' understanding of the material and to make any changes to the pace of the lessons. The quizzes will be more conceptual than computational, i.e. they might require more writing than calculator work. Therefore, it is essential to have an intuitive understanding of calculus. Memorizing methods for solving problems will not be enough.

Structure of Class time

Classes will consist of lecture, class work, and quizzes. We will have a 10 minute break for every 2 hour block.

Lessons

Class	Lesson
1	**Part 1: The Limit Process**
	An Introduction to the Limit Process
	Finding Limits Graphically and Numerically
2	Finding Limits Analytically Continuity and One-sided Limits Infinite Limits/Vertical Asymptotes
3	**Part 2: Derivatives**
	The Tangent Line Problem
4	Basic Differentiation Rules Rates of Change The Product and Quotient rules
5	Derivatives of Trigonometric Functions Higher Order Derivatives
6	The Chain Rule Implicit Differentiation
7	Related Rates
8	*Continuation of Lesson 7*
9	Extrema on an Interval
	Rolle's Theorem and the Mean Value Theorem
	Increasing and Decreasing Functions and the First Derivative Test
	Concavity and the Second Derivative Test
10	Limits at infinity/Horizontal Asymptotes Curve Sketching
11	*Continuation of Lesson 10*
12	Optimization Problems
13	*Continuation of Lesson 12*
14	Newton's Method Differentials
15	**Part 3: Integration**
	Antiderivatives
16	The Fundamental Theorems of Calculus
17	Integration by Substitution
18	The Natural Logarithm Function Exponentials
19	Integrations Tables
20	Areas between Curves
21	Disc Method Shell Method Volumes of Cross Sections
22	*Continuation of Lesson 20*
23	Differential Equations Slope Fields
24	Integration by Parts
25	*Continuation of Lesson 23*
26	Review/Mock AP Test
27	Review/Mock AP Test
28	Review/Mock AP Test
29	Review/Mock AP Test
	Review/Mock AP Test