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ADVANCED PLACEMENT CALCULUS BC

Goals of AP Calculus BC

I. Work with functions and non-functions represented in a variety of ways: Graphical, numerical, analytical, or verbal. The students should understand the connections among these representations.
II. Understand the meaning of the derivative in terms of a rate of change and local linear approximation and be able to use derivatives to solve a variety of problems. [C2]
III. Understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of a rate of change and should be able to use integrals to solve a variety of problems.
IV. Understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.
V. Communicate mathematics both orally and in well-written sentences and should be able to explain solutions to problems.
VI. Model a written description of a physical situation with a function, a differential equation, or an integral.
VII. Use technology to help solve problems, experiment, interpret results, and verify conclusions.
VIII. Determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.
IX. Develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.
X. Give a geometric interpretation of differential equations via slope fields and the relationship between slope fields and solution curves for differential equations.

All AP Calculus BC students have completed the required secondary mathematics courses designed for college-bound students. This includes prerequisite courses in which the students study algebra, geometry, trigonometry, analytic geometry, and elementary functions. An extended initial effort in this course ensures all enrolled students are familiar with the properties of functions, the algebra of functions, the graphs of functions, the language of functions (domain and range, odd and even, periodic, symmetry, zeros, intercepts, etc.) and know the exact values of trigonometric functions.

Each student is required to have a TI-84/83 Plus Graphing Calculator Students are given instruction to:

1- Plot the graph of a function with an arbitrary viewing window.
2- Find the zeros, maximums, and minimums of functions.
3- Numerically and graphically calculate the derivative of a function.
4- Numerically and graphically calculate the definite integral.

5- Plot the graph of the first and second derivative of a function to analyze the graph of the function.
6- Use Newton's method.

Chapter 1: Limits and their Properties

1.1 A Preview of Calculus
1.2 Finding Limits Graphically and Numerically
1.3 Evaluating Limits Analytically
1.4 Continuity and One-Sided Limits
1.5 Infinite Limits

Chapter 2: Differentiation

2.1 The Derivative and the Tangent Line Problem
2.2 Basic Differentiation Rules and Rates of Change
2.3 The Product and Quotient Rules and Higher-Order Derivatives
2.4 The Chain Rule
2.5 Implicit Differentiation
2.6 Related Rates

Chapter 3: Applications of Differentiation

3.1 Extrema on an Interval
3.2 Rolle's Theorem and The Mean Value Theorem
3.3 Increasing and Decreasing Functions and the First Derivative Test
3.4 Concavity and the Second Derivative Test
3.4 Limits of Infinity
3.6 A Summary of Curve Sketching
3.7 Optimization Problems
3.8 Newton's Method
3.9 Differentials

Chapter 4: Integration

4.1 Antiderivatives, Indefinite Integration, and Introduction to Slope Fields
4.2 Area
4.3 Riemann Sums and Definite Integrals
4.4 The Fundamental Theorem and Second Fundamental Theorem of Calculus
4.5 Integration by Substitution
4.6 Numerical Integration

Chapter 5: Logarithmic, Exponential, and other Transcendental Functions

5.1 The Natural Logarithmic Function: Differentiation
5.2 The Natural Logarithmic Function: Integration
5.3 Inverse Functions
5.4 Exponential Functions: Differentiation and Integration
5.5 Bases other than e and Applications
5.6 Differential Equations: Growth and Decay
5.7 Differential Equations: Separations of Variables
5.8 Inverse Trigonometric Functions: Differentiation
5.9 Inverse Trigonometric Functions: Integration

Chapter 6: Differential Equations
6.1 Slope Fields and Euler's Method
6.2 Differential Equations
6.3 Separation of variables and Logistics Function
6.4 First order Linear differential Equations

Chapter 7: Applications of Integration
7.1 Area of a Region between Two Curves
7.2 Volume: The Disk Method
7.3 Volume: The Shell Method
7.4 Arc Length and Surfaces of Revolution
7.5 Work

Chapter 8: Integration Techniques, L'Hopital's Rule, and Improper Integrals
8.1 Basic Integration Rules
8.2 Integration by Parts
8.3 Trigonometric Integrals
8.4Trigonometric Substitution
8.5 Partial Fractions
8.6 Integration by Tables and Other Integration Techniques
8.7 Indeterminate Forms and L'Hopital's Rule
8.8 Improper Integrals

Chapter 9: Infinite Series
9.1 Sequences
9.2 Series and Convergence
9.3 The Integral Test and p-Series
9.4 Comparison of Tests
9.5 Alternating Series
9.6 The Ratio and Root Tests
9.7 Taylor Polynomials and Approximations
9.8 Power Series
9.9 Representation of Functions by Power Series
9.10 Taylor and Maclaurin Series

Chapter 10: Conics, Parametric Equations, and Polar Coordinates
10.1 Conics and Calculus
10.2 Plane Curves and Parametric Equations
10.3 Parametric Equations and Calculus
10.4 Polar Coordinates and Polar Graphs
10.5 Area and Length in Polar Coordinates
10.6 Polar Equations of Conics and Kepler's Laws

Testing or Evaluation Procedures

*Chapter Tests: Cumulative and AP Style Format and Grading
*Quizzes: written and verbal also include rules and theorems.

Teaching Style and Method

Students are assigned to study groups for the purpose of working outside and inside of class to comprehend assignments. Students are provided solutions guides and electronic copy to the textbook. Time is allotted to class time to go over assigned problems from the textbook. This is completed through teacher directed demonstrations and/or study group written on the whiteboards in the classroom. The following methods are used weekly:

A- Lecture/Demonstration
B- Whiteboard and/or Projector with graphing calculator.
C- Assigned study partners (group) for work time-(no more than three)
D- Whiteboard work: individual and study partners (group)
E- Math Lab work: graphing calculator activities, free response type question/answer periods-verbal, whiteboard, complete at seat written.
F- Use the approach and answering fours ways: Numerically, verbally, analytically, and graphically.

Instructional Materials

Each student has a copy of the primary textbook for this course which is:

- Larson, Edwards,"Calculus of a Single Variable, AP Edition", 9th Ed., 2010
- Student Solutions Guide
- Barron's AP Calculus, 12th Ed.
- Mr. White's Newton Guide

Assessment

Students will have AP style Testing of learned material composed of multiple choice and free Response sections. Take Home Tests are assigned and homework is collected daily. Homework is graded on completion. Completion means showing work to solve the problem not just the answer. Remember, this an **AP** course and requires more responsibility of the student to succeed. **All students are required to take a midterm exam**. If the student satisfies the grade and attendance policy, then the student may exempt the second semester exam.
Homework is 15%, Tests are 85% of total grade.

Extra Help

Help is provided after School, please advise me in advance so that I can meet you in room 906.