

Kendall Park Learning Center

Course Title: AP Calculus AB (Enrichment)

Course Length: Six Weeks (120 Hours)

Description:

This course will provide a thorough overview of the concepts of differential and integral calculus. Course content will include Limits and Continuity, Derivatives, Applications of Derivatives, The Definite Integral, Applications of Definite Integrals, and an introduction to Differential Equations and Slope Fields.

The method of instruction varies. Lecture is used for presentation of new concepts. Students are encouraged to participate frequently in class. Homework is assigned to enhance the daily session. It is designed to take students approximately 1 ½ to 2 hours each day. With the exception of the first and last day, quizzes are given frequently to assess the students' progress on covered material. All major tests are announced and a final exam is given to test student recall of skills for the next six-week course.

Topics covered

Review of Pre-calculus

- Graphs and models
 - Linear models and rates of change
 - Functions and their respective graphs
 - Fitting models to data

Limits

- Evaluating limits graphically, numerically and analytically
- Continuity and One-Sided Limits
- Infinite limits

Derivative

- Definition of a derivative
- Rules of differentiation, related rates
- Implicit differentiation

Applications of Differentiations

- Extremas
- Rolle's Theorem and Mean Value Theorem
- Increasing and decreasing function, First Derivative Test
- Concavity, Second Derivative Test
- Limits(revisited)
- Sketching graphs
- Optimization problems

Integration (Antiderivative)

- Definition of an Antiderivative, Rules of integration
- Sigma Notation
- Riemann Sums
- The Fundamental Theorem of Calculus
- Integration by substitution

- Numerical Integration – Simpson and Trapezoidal rules

Differentiating and Integrating Transcendental Functions

- Natural Logarithm Function $\ln(x)$
- Natural Exponential Function e^x
- Differential Equations - Growth and decay, separation of variables, slope fields

Application of integration

- Area between curves
- Volume – disk, washer and shell methods
- Volume of solids with known cross sections
- Arc length and Surface revolution (optional)
- Work (optional)

Textbooks and other course materials

- Calculus of a single variable 7th Ed. by Larson, Hostetler, Edwards.
- TI-83 or TI-84