AP Calculus AB Midterm Exam Topic List

Below is a list of topics found on the Midterm Exam. For Units 1–3, section numbers from the textbook that relate to the topics are in parentheses, but don't forget that some sections also had supplements.

Unit 1: Limits, Continuity, and Rates of Change

- Finding limits using graphs, tables, and algebraic techniques (2.2 , 2.3, 2.6)
- Limit definitions of horizontal and vertical asymptotes (2.6)
- Continuity and Intermediate Value Theorem (2.5)
- Approximating numerical derivatives using tables and graphs (2.7)
- Differentiability and limit definition of the derivative (2.7, 2.8)

Unit 2: Differentiation

- Power rule (3.1)
- Product and quotient rules (3.2)
- Trigonometric functions (3.3)
- Chain rule!! (3.4)
- Exponential functions (3.1, 3.4)
- Implicit differentiation (3.5)
- General inverse, inverse sine and inverse tangent functions (3.5)
- Logarithmic functions and logarithmic differentiation (3.6)
- Higher-order derivatives (3.1–3.6)
- Tangent lines (3.1–3.6)

Unit 3: The Shape of a Curve

- Mean Value Theorem (4.2)
- Increasing/decreasing intervals (4.3)
- Intervals of concavity (4.3)
- Relative extreme values by First and Second Derivative Tests (4.3)
- Points of inflection (4.3)
- L'Hôpital's Rule (4.4)

Unit 4: Further Applications of Differentiation

This list is longer than the previous three because over 50% of the questions on the Midterm Exam are from Unit 4.

Rates of Change in the Natural and Social Sciences

- Find and interpret instantaneous rates of change in any given context
- Solve rectilinear motion problems given either a function or graph of position or velocity

Related Rates

- Understand the related rates method (every variable is derived implicitly with respect to time)
- Most common types: Pythag, Cone, Angle, Shadow

Linearization and Differentials

- Linearization: Use tangent line to approximate function value and determine whether the approximation is an over- or under-estimate
- Differentials: Use derivative to approximate change in function value
- Make sure you can work application problems for both, and can determine your own function and point of tangency when using linearization to approximate numeric values

Absolute Extreme Values on an Interval

- Know this process well: (1) Find critical numbers inside the interval; (2) Determine function values for endpoints and critical number(s); (3) Largest value(s) are absolute max(es) and smallest value(s) are absolute min(s)

Applied Optimization

- Understand the applied optimization method
- Most common types: Geometric figures (rectangular garden, container in the shape of rectangular prism, etc.), Closest point(s) to a curve, Cost, Inscribe rectangles inside regions