

## **AP Calculus BC**

### *1st Semester Review*

The 1st semester exam will consist of two parts similar in style to Section I of the AP exam:

- Part A has 28 multiple-choice questions with a 55-minute time limit. No calculator is allowed.
- Part B has 17 multiple-choice questions with a 50-minute time limit. A calculator is required.

You are encouraged to review previous tests, quizzes, assignments, and other extraneous problems presented in class. There are also several online and published AP exam preparation materials available that might be helpful for this test.

The topics listed below are those that will be emphasized on the semester exam. Please understand some questions might require several concepts presented throughout the semester. Also note the semester exam is not restricted to only the concepts described below – any information presented in class this semester is “fair game”.

#### *Topics Emphasized on the Exam:*

#### **Limits and Continuity**

- apply limit properties for limit evaluation, including one-sided limits
- evaluate infinite limits and limits at infinity
- use l’Hospital’s rule to evaluate limits
- use limits to define asymptotes
- apply the definition of continuity
- recognize and define types of discontinuities
- redefine a function to remove discontinuities

#### **Derivatives**

- connect slope of a curve and the rate of change in a function
- recognize limit definitions of a derivative
- find the tangent line to a curve at a point
- approximate numerical derivatives graphically and numerically
- apply the definition of differentiability
- recognize and define types of non-differentiabilities
- understand the relationship between continuity and differentiability

## **Differentiation**

- differentiate common function, including
  - polynomials
  - radical
  - trigonometric
  - inverse trigonometric
  - exponential
  - logarithmic
- apply differentiation rules, including
  - product rule
  - quotient rule
  - chain rule
- apply implicit differentiation
- find higher order derivatives
- evaluate numerical derivatives with the calculator
- find the derivative of an inverse function

## **Graph Behavior**

- understand and use the Mean Value Theorem
- describe a function's increasing and decreasing behavior
- find absolute and relative extrema
- describe a function's concavity
- apply the first and second derivative tests

## **Derivative Applications**

- understand the relationships among position, velocity, and acceleration
- find displacement and distance traveled
- find intervals of speeding up and slowing down
- solve problems involving related rates
- solve optimization problems
- use linearization to approximate function values
- use differentials to estimate the change in function values, including propagated error

## **Integrals**

- approximate integrals using rectangle and trapezoid approximation methods
- find general and specific antiderivatives
- evaluate definite integrals with the calculator
- find the average value of a function