

## Chapter 1 - Functions and Models

- Evaluate functions, find the domain of functions, sketch functions (including piecewise functions).
- Know the general shapes of basic graphs: linear, quadratic, cubic, reciprocal, exponential, logarithmic, trigonometric.
- Combine functions with addition, subtractions, multiplication, division and composition. Find the domains of these new functions.
- Properties of exponential functions.
- Properties of logarithmic functions.
- Solve exponential and logarithmic equations; use laws of exponents and laws of logarithms.

## Chapter 2 - Limits and Derivatives

- Find the limit of a function graphically, numerically, and algebraically.
- Determine if a function is continuous, both graphically and by using the definition of continuity.
- Evaluate infinite limits and limits at infinity. Find vertical and horizontal asymptotes.
- Use the limit definition of the derivative to compute the slope of a tangent line or a velocity.
- Use the limit definition of the derivative to obtain a formula for the derivative.

## Chapter 3 - Differentiation Rules

- Find the derivative of a polynomial.
- Find derivatives using the product rule and quotient rule.
- Find the derivative of trig functions.
- Find derivatives using the chain rule.
- Use implicit differentiation to find derivatives.
- Find higher derivatives (using all of the above mentioned techniques).
- Find derivatives of logarithmic functions and exponential functions.

- Find the velocity and acceleration functions given a position function.
- Solve related rates problems.

## Chapter 4 - Applications of Differentiation

- Find absolute extrema of continuous functions on closed intervals.
- Find and classify critical numbers of a function using either the First Derivative Test or the Second Derivative Test.
- Identify the intervals where a function is increasing and decreasing.
- Identify the intervals of concavity of a function.
- Evaluate limits of indeterminate forms of type  $\frac{0}{0}$ ,  $\frac{\infty}{\infty}$ ,  $0 \cdot \infty$  and  $\infty - \infty$ .
- Solve optimization problems.
- Find the antiderivative of a function.
- Find the position function given the acceleration function and some initial conditions.

## Chapter 5 - Integrals

- Find the area under a curve.
- Know the definition of the definite integral as the limit of a Riemann sum. Know how to use the definition to evaluate an integral.
- Know the Fundamental Theorem of Calculus (Parts 1 and 2). Use it to compute derivatives and definite integrals.
- Compute indefinite integrals.
- Evaluate integrals (both definite and indefinite) using the substitution rule.