

- 4.3 Use formulas to find the derivative of the sum, product, quotient, inverse, and composite (e.g., chain rule) of elementary functions
- 4.4 Use formulas to find the derivative of algebraic, trigonometric, exponential, and logarithmic functions and their inverses, as well as implicitly defined functions
- 4.5 Understand the difference between differentiability and continuity
- 4.6 Use L'Hospital's Rule to find the limit of functions whose limits yield indeterminate forms (e.g., $0/0$ and ∞/∞)
- 4.7 Understand the application (e.g., both algebraically and graphical) of the Mean Value Theorem for derivatives
- 4.8 Use derivatives to solve a variety of problems (e.g., problems involving tangent and normal lines to a curve, curve sketching, velocity, acceleration, average and instantaneous rates of change, Newton's method for approximating roots of a function, differentials and linear approximation, and optimization)
- 4.9 Find the indefinite integral of algebraic, exponential, logarithmic, and trigonometric functions using a variety of techniques (e.g., formula substitution, identity substitution, change of variables)
- 4.10 Understand the properties of the definite integral (e.g., the Fundamental Theorem of Integral Calculus, the definite integral as an area and as a limit of a sum)
- 4.11 Understand the language of functions (domain, range, odd and even, periodic, symmetry, zeros, intercepts and so on)
- 4.12 Know the trigonometric values of common angles such as 0 , $\pi/6$, $\pi/4$, $\pi/3$, and $\pi/2$

Standard 5: The student understands and applies basic and advanced concepts of statistics and data analysis.

- 5.1 Select and use the best method of representing and describing a set of data analysis (e.g., graphical, numerical, analytical, or verbal)
- 5.2 Make inferences and convincing arguments that are based on data analysis (e.g., approximate rate of change from graphs and tables of data)
- 5.3 Use integral calculus to find the average value of a function

Standard 7: The student understands and applies basic and advanced properties of the concepts of geometry.

- 7.1 Understand the nature and purpose of axiomatic systems (e.g., Euclidean geometry as a complete axiomatic system)
- 7.2 Understand asymptotes in terms of graphical behavior and describe the behavior in terms of limits involving infinity
- 7.3 Geometric understanding of graphs of continuous functions (Intermediate Value Theorem and Extreme Value Theorem)
- 7.4 Understand the complex characteristics of the graphs of functions (e.g., continuity, extreme values, maximum and minimum points, asymptotes, end behavior, concavity)
- 7.5 Use derivatives to determine slope of a curve at a point, including points at which there are vertical tangents and points at which there are not tangents
- 7.6 Understand the corresponding characteristics of graphs of a function and its first and second derivative (e.g., critical points and points of inflection)
- 7.7 Understand the relationship between the increasing and decreasing behavior of a function and the sign of the first derivative
- 7.8 Understand the relationship between the concavity of a function and the sign of the second derivative

Standard 8: The student understands and applies basic and advanced properties of the concepts of measurement.

8.1 Use integral calculus to solve a variety of problems (e.g., problems involving distance, velocity from acceleration with initial conditions, growth and decay, average value of a function, area under a curve, area between curves, volumes of solids of revolution)

8.2 Understand the difference between average and instantaneous rates of change and velocity

8.3 Interpret the derivative as a rate of change in varied applied contexts including position, velocity, and acceleration

8.4 Model rates of change, including related rates problems

Standard 9: The student understands and applies basic and advanced properties of the structure of mathematics.

9.1 Construct logical verifications or counter examples to test conjectures and to justify algorithms and solutions to problems (i.e., use deductive reasoning)

9.2 Use formal mathematical language and notation to represent ideas, to demonstrate relationships within and among representation systems, and to formulate generalizations

9.3 Understand the relationship between the derivative and the definite integral and use them to solve a variety of problems

9.4 Understand and use the Fundamental Theorem of Calculus