Limits of functions (including one-sided limits). Topics include an intuitive understanding of the limiting process, calculating limits using algebra, and estimating limits from graphs or tables of data .

Asymptotic and unbounded behavior. Topics include understanding asymptotes in terms of graphical behavior, describing asymptotic behavior in terms of limits involving infinity, and comparing relative magnitudes of functions and their rates of change (for example, contrasting exponential growth, polynomial growth, and logarithmic growth) .

Continuity as a property of functions. Topics include an intuitive understanding of continuity . (The function values can be made as close as desired by taking sufficiently close values of the domain.), understanding continuity in terms of limits, geometric understanding of graphs of continuous functions (Intermediate Value Theorem and Extreme Value Theorem) .

Concept of the derivative -- Derivative presented graphically, numerically, and analytically .

Concept of the derivative -- Derivative interpreted as an instantaneous rate of change .

Concept of the derivative -- Derivative defined as the limit of the difference quotient .

Concept of the derivative -- Relationship between differentiability and continuity .

Derivative at a point. Topics include slope of a curve at a point, tangent line to a curve at a point and local linear approximation, instantaneous rate of change as the limit of average rate of change, approximate rate of change from graphs and tables of values .

Derivative as a function. Topics include corresponding characteristics of graphs of f and f', relationship between the increasing and decreasing behavior of f and the sign of f'.

The Mean Value Theorem and its geometric interpretation .

Equations involving derivatives . Verbal descriptions are translated into equations involving derivatives and vice versa .

Second derivatives. Topics include corresponding characteristics of the graphs of f, f', and f'', relationship between the concavity of f and the sign of f'', points of inflection as places where concavity changes.

Applications of derivatives, including analysis of curves, including the notions of monotonicity and concavity .

Analysis of planar curves given in parametric form, polar form, and vector form, including velocity and acceleration .

Optimization, both absolute (global) and relative (local) extrema .

Modeling rates of change, including related rates problems .

Use of implicit differentiation to find the derivative of an inverse function .

Interpretation of the derivative as a rate of change in varied applied contexts, including velocity, speed, and acceleration .

Geometric interpretation of differential equations via slope fields and the relationship between slope fields and solution curves for differential equations .

Numerical solution of differential equations using Euler's method .

L'Hospital's Rule, including its use in determining limits and convergence of improper integrals and series .

Knowledge of derivatives of basic functions, including power, exponential, logarithmic, trigonometric, and inverse trigonometric functions .

Derivative rules for sums, products, and quotients of functions .

Chain rule and implicit differentiation .

Derivatives of parametric, polar, and vector functions .

Interpretations and properties of definite integrals, including definite integral as a limit of Riemann sums.

Definite integral of the rate of change of a quantity over an interval interpreted as the change of the quantity over the interval: $\int_a^b f'(x)\,dx = f(b) - f(a)$

Basic properties of definite integrals (examples include additivity and linearity).

Applications of integrals. Appropriate integrals are used in a variety of applications to model physical, biological, or economic situations . Examples include finding the area of a region (including a region bounded by polar curves), the volume of a solid with known cross sections, the average value of a function, the distance traveled by a particle along a line, the length of a curve (including a curve given in parametric form), and accumulated change from a rate of change .

Use of the Fundamental Theorem to evaluate definite integrals .

Use of the Fundamental Theorem to represent a particular antiderivative, and the analytical and graphical analysis of functions so defined .

Antiderivatives following directly from derivatives of basic functions .

Antiderivatives by substitution of variables (including change of limits for definite integrals), parts, and simple partial fractions (nonrepeating linear factors only) .

Improper integrals (as limits of definite integrals) .

Finding specific antiderivatives using initial conditions, including applications to motion along a line .

Solving separable differential equations and using them in modeling (including the study of the equation $y' = ky$ and exponential growth) .

Solving logistic differential equations and using them in modeling .

Numerical approximations to definite integrals. Use of Riemann sums (using left, right, and midpoint evaluation points) and trapezoidal sums to approximate definite integrals of functions represented algebraically, graphically, and by tables of values .

Concept of series. A series is defined as a sequence of partial sums, and convergence is defined in terms of the limit of the sequence of partial sums .

Geometric series with applications .

The harmonic series .

Alternating series with error bound .

Terms of series as areas of rectangles and their relationship to improper integrals, including the integral test and its use in testing the convergence of p-series .

The ratio test for convergence and divergence .

Comparing series to test for convergence or divergence .

Taylor polynomial approximation with graphical demonstration of convergence (for example, viewing graphs of various Taylor polynomials of the sine function approximating the sine curve) .

Maclaurin series and the general Taylor series centered at $x = a$.

Formal manipulation of Taylor series and shortcuts to computing Taylor series, including substitution, differentiation, antidifferentiation, and the formation of new series from known series .

Functions defined by power series.

Radius and interval of convergence of power series, and the Lagrange error bound for Taylor polynomials.