



ALLEN ACADEMY

Calculus AB Course Description

2019-2020

Text: *Calculus of a Single Variable, 11th Edition* (Larson & Edwards); ISBN 978-1-337-28690-9

First Trimester Topics	Second Trimester Topics	Third Trimester Topics
<p>Limits and their Properties</p> <ul style="list-style-type: none">- The Tangent Line Problem- The Area Problem- An Introduction to Limits- Limits That Fail to Exist- Properties of Limits- Strategies for Finding Limits<ul style="list-style-type: none">AnalyticallyGraphicallyUsing tables to approximate limits- Continuity to a point and one sided limits- One-Sided Limits and Continuity on a Closed Interval- The Squeeze Theorem for limits- Properties of Continuity- The Intermediate Value Theorem- Definition of and determination of Infinite Limits and Vertical Asymptotes<ul style="list-style-type: none">Limits of InfinityLimits at Infinity <p>Differentiation</p> <ul style="list-style-type: none">- Use graphing calculators: zoom-in exercises and local linearity- The tangent line problem- Definition of the Derivative of a function- Sketching a Derivative Based on the Graph of $g(x)$- Relationship between differentiability	<p>Applications of Differentiations</p> <ul style="list-style-type: none">- Extrema of a function- Relative extrema and critical numbers- Extrema on a closed interval- Rolle's Theorem and the Mean Value Theorem- Increasing and decreasing functions- The First Derivative Test<ul style="list-style-type: none">Relative and absolute extrema- The Second Derivative Test<ul style="list-style-type: none">ConcavityPoints of inflection- Horizontal asymptotes- Curve-sketching techniques<ul style="list-style-type: none">Graphing given the functional equationRelatingSymmetry of graphs- Applied Minimum and Maximum Problems (Optimization)- Calculating differentials- Linear approximations- Tangent line approximations- Application problems involving position, velocity, and acceleration, and rectilinear motion- Graphical analysis of position versus time, velocity versus time, and acceleration versus time	<p>Logarithmic, Exponential, and other Transcendental Functions</p> <ul style="list-style-type: none">- The natural logarithmic function- The number e as a limit- The derivative of the natural log function- Log rule for integration- Integrals of trigonometric functions- Inverse Functions- Existence of an inverse function- Derivative of an inverse function- The natural exponential functions- Derivatives of exponential functions- Integrals of exponential functions- Bases other than e- Applications of exponential functions- Differential equations and separation of variables- Growth and decay models- Newton's Law of Cooling- Slope Fields<ul style="list-style-type: none">Geometric interpretation of slope fields and differential equationsDrawing slope fields- Euler's Method as a numerical solution of a differential equation- Inverse trigonometric functions: Domains, ranges, and graphs- Derivatives of inverse trigonometric functions- Integration of inverse trigonometric functions



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<p>and continuity Zoom-in activity for ; Sharp turn discussion Vertical tangent discussion</p> <ul style="list-style-type: none">- Differentiation Rules<ul style="list-style-type: none">Power RuleConstant Multiple RuleSum and Difference Rule- Derivatives of Sine and Cosine Functions- Graphing only:- Approximating rates of change from graphs and tables- The product rule and quotient rule- Derivatives of trigonometric functions- Higher-Order Derivatives- Position, Velocity, Acceleration Functions- The Chain Rule- The General Power Rule- Trigonometric Functions and the Chain Rule- Implicit Differentiation- Related Rates	<p>Integration</p> <ul style="list-style-type: none">- Antiderivatives and indefinite integration- Notation for anti-derivatives- Basic Integration Rules- Initial Conditions and Particular Solutions- Area: Sigma Notation- The Area of a Plane Region- Definite integral as a limit of a Riemann Sum<ul style="list-style-type: none">Upper, Lower, Midpoint sumsUse Riemann sums and trapezoidal sums to approximate definite integrals presented analytically, graphically, or as tables of data- Trapezoidal Rule- Definite Integrals and their properties- Use of the First Fundamental Theorem of Calculus in evaluating integrals- The Mean Value Theorem for Integrals- Average Value of a Function- The Second Fundamental Theorem of Calculus- Integration by substitution; change of variables in the integration process- The General Power Rule for integration- Change of Variables for Definite Integrals- Integration of even and odd Functions- Functions defined by integrals- Error Analysis	<p>Applications of Integration</p> <ul style="list-style-type: none">- The integral defined as the accumulation of rates of change- Area of a region between two curves- Volume of solids of revolution<ul style="list-style-type: none">the disk and washer methodsthe shell method- Volume of solids with known cross sections- Arc length in $f(x)$ form- Integration involved with motion applications of position, velocity, and acceleration<ul style="list-style-type: none">Using initial conditions and the definite integral to calculate distance traveled