



ALLEN ACADEMY

| Calculus AB 2017-2018 | | |
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| 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 at 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 exercise and local linearity- The tangent line problem- Definition of the Derivative of a function- Sketching a Derivative Based on the Graph of $f(x)$- Relationship between differentiability and continuity<ul style="list-style-type: none">Zoom-in activity for ;Sharp turn discussionVertical tangent discussion- Differentiation Rules<ul style="list-style-type: none">Power Rule | <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 extremaThe 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 equationRelating f, f', f''Symmetry 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>Integration</p> <ul style="list-style-type: none">- Antiderivatives and indefinite integration- Notation for anti-derivatives | <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>Constant Multiple Rule Sum and Difference Rule</p> <ul style="list-style-type: none">- Derivatives of Sine and Cosine Functions- Graphing only : f, f', f''- 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 | <ul style="list-style-type: none">- 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. |
| Instructional Resources: | | |
| <ul style="list-style-type: none">• Textbook: <i>Calculus of a Single Variable, Eighth Edition</i> by Larson, Hostetler, and Edwards | | |