



Single Variable Calculus, Early Transcendentals



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Source	Author(s) (Text or Video)	Title(s)	Link (where applicable)
OpenStax	Gilbert Strang, Massachusetts Institute of Technology Edwin “Jed” Herman, University of Wisconsin-Stevens Point	Calculus Volume 1 Calculus Volume 2	OpenStax
Mathispower4u Videos	James Sousa		Mathispower4u Videos

Alta Single Variable Calculus was developed to meet the scope and sequence of a typical two-semester calculus course. To develop the course, Knewton used three main sources of content: Openstax, videos created by a Math Professor we have partnered with, and a team of Subject Matter Experts. The SMEs come from diverse backgrounds and are all academics in the field of mathematics.

Alta Single Variable Calculus has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our OpenStax text content, instructional videos, and Knewton SMEs, we were able to solicit ideas from math instructors and students. Alta Single Variable Calculus covers the typical breadth of calculus topics, and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

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Chapter 1: A Review of Functions and Graphs

1.1 Review of Functions

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 - Represent functions using tables, graphs, or formulas
- Symmetry of Functions, Absolute Value, and Function Composition
 - Combine functions using mathematical operators or function composition
 - Understand the symmetry of functions and the absolute value function

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 - Use tools such as the quadratic formula and end behavior to graph polynomial functions
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 - Find the Maclaurin series for a logarithmic or exponential function
 - Find a Maclaurin series by differentiating another series
- Applications of the Taylor and Maclaurin Series
 - Evaluate a nonelementary definite integral using a Taylor series
 - Approximate a probability using a Maclaurin series
 - Approximate the period of a pendulum using a binomial series

Chapter 11: Parametric Equations and Polar Coordinates

11.1 Parametric Equations

- Write Parametric Equations
 - Parameterize a curve
 - Find the parametric equations for a line segment given an orientation
- Eliminate the Parameter
 - Eliminate the parameter in linear equations
 - Eliminate the parameter in polynomial and radical equations
 - Eliminate the parameter in exponential and logarithmic equations
 - Eliminate the parameter in trigonometric parametric equations
- Graph Parametric Equations
 - Graph parametric equations by plotting points
 - Graph trigonometric parametric equations by plotting points
 - Use parametric equations in applications
- Cycloids
 - Graph a cycloid defined by parametric equations
 - Determine the number of cusps on a hypocycloid

11.2 Calculus of Parametric Curves

- Derivatives of Parametric Equations
 - Find the derivative of a curve defined by polynomial parametric equations
 - Find the derivative of a curve defined by trigonometric parametric equations
 - Find the equation of a line tangent to a parametrically defined curve
 - Find the second derivative of curve defined by parametric equations
 - Integrating Parametric Curves
 - Find the area under a curve defined by parametric equations
 - Find the arc length of a curve defined by trigonometric parametric equations
 - Find the surface area of a volume of revolution generated by revolving a parametrically defined curve
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11.3 Polar Coordinates

- Defining Polar Coordinates
 - Locate points in a plane by using polar coordinates
 - Convert coordinates from polar form to rectangular form
 - Convert coordinates from rectangular form to polar form
- Converting Equations Between Rectangular and Polar Forms
 - Convert a cartesian equation to polar form
 - Convert a polar equation to cartesian form
- Graphs Using Polar Coordinates
 - Identify symmetry in polar equations and curves
 - Graph polar equations by plotting points and find zeros and maximum values for a polar equation

11.4 Calculus in Polar Coordinates

- Area and Arc Length in Polar Coordinates
 - Find the area of a region between two polar curves
 - Find the arc length of a polar curve
 - Find the area of a region bounded by a polar curve
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