

Finite Mathematics with Business Calculus

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Alta Finite Math with Business Calculus was developed to meet the scope and sequence of a typical one semester Finite Math with Calculus course. To develop the course, Knewton used a variety of different source content, including OpenStax Calculus, a Math in Society textbook developed by a professor at Pierce College and the Open Course Library project, videos created by a Math Professor we have partnered with, and a team of Subject Matter Experts (SMEs). The SMEs come from diverse backgrounds and are all accomplished academics in the field of Mathematics.

Alta Finite Math with Business Calculus has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our text, video, and Knewton SMEs, we were able to solicit ideas from math instructors and students at all levels of higher education. Alta Finite Math with Business Calculus covers the typical breadth of topics and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

Finite Mathematics and Calculus | Table of Contents

Chapter 1: Algebra Reference

1.1 Properties of Real Numbers and Polynomials

- Properties of Real Numbers
 - Use the following properties of real numbers: inverse and identity
 - Use the following properties of real numbers: commutative, associative, and distributive
- Polynomials
 - Add and subtract polynomials
 - Multiply binomials together
 - Multiply polynomials together
 - Perform operations with polynomials of several variables

1.2 Factoring

- Factoring Quadratics
 - Factor the greatest common factor of a polynomial
 - Factor a trinomial
 - Factor a trinomial by grouping
 - Factor a perfect square trinomial
 - Factor a difference of squares
- Other Factoring Techniques
 - Factor a cubic by grouping
 - Factor the sum and difference of cubes
 - Factor expressions using fractional or negative exponents
 - Factor expressions using greatest common factor and other technique

1.3 Rational Expressions

- Operations on Rational Expressions
 - Simplify rational expressions
 - Multiply rational expressions
 - Divide rational expressions
 - Add and subtract rational expressions

1.4 Equations

- Linear Equations
 - Identify identity, conditional, and inconsistent equations
 - Solve equations in one variable algebraically, variable just on one side
 - Solve equations in one variable algebraically, variable on both sides
 - Quadratic Equations
 - Solve quadratic equations by factoring, leading coefficient 1
 - Solve quadratic equations by factoring, leading coefficient > 1
 - Solve quadratic equations by using the quadratic formula
-

- Rational Equations
 - Solve a rational equation, monomials in denominator
 - Solve a rational equation, binomials in denominator
 - Solve a rational equation, requires factoring to find least common denominator

1.5 Inequalities

- Linear Inequalities
 - Use interval notation
 - Use properties of inequalities
 - Solve simple inequalities in one variable algebraically
- Quadratic and Rational Inequalities
 - Solve quadratic inequalities in one variable, graph the solution set, and express the solution set using interval notation
 - Solve inequalities that involve rational expressions, graph the solution sets, and express the solution set using interval notation

1.6 Exponents

- Properties of Exponents
 - Understand exponent notation
 - Use the product rule of exponents
 - Use the quotient rule of exponents
 - Use the power rule of exponents
- Advanced Properties of Exponents
 - Use the negative and zero exponent rule
 - Find the power of a product
 - Find the power of a quotient
 - Simplify exponential expressions

1.7 Radicals

- Simplify Radicals
 - Evaluate square roots
 - Use the product rule to simplify square roots
 - Use the quotient rule to simplify square roots
- Operations with Radicals
 - Add and subtract square roots
 - Rationalize denominators with a monomial denominator
 - Rationalize denominators using the conjugate

Chapter 2: Linear Functions

2.1 Slopes and Equations of Lines

- Cartesian Coordinate System
 - Plot ordered pairs in a Cartesian coordinate system
 - Graph equations by plotting points
-

- Identify Slopes and Intercepts
 - Find the slope of a line given two points
 - Understand the relationship between the slope and y-intercept of a line and its equation
 - Find x -intercepts and y -intercepts
- Finding Linear Equations
 - Find equation of a line, in slope-intercept form, given slope and one point (point-slope formula)
 - Find equation, in slope-intercept form, of a line passing through two given points
 - Given slope and intercept, find the equation of a line and write it in standard form
 - Find the equation of vertical and horizontal lines
- Graphing Linear Equations
 - Graph a linear equation using the slope and the origin
- Parallel and Perpendicular Lines
 - Given the equations of two lines, determine whether their graphs are parallel or perpendicular
 - Write the equation of a line parallel to a given line
 - Write the equation of a line perpendicular to a given line

2.2 Linear Functions and Applications

- Linear Functions
 - Understand function notation
 - Evaluate a linear function at a value
- Applications of Linear Functions
 - Solve supply and demand problems using linear functions
 - Solve cost analysis problems using linear functions
 - Solve break even analysis problems using linear functions

2.3 The Least Squares Line

- The Least Squares Line
 - Find the linear regression equation given a list of data points
 - Make predictions using a line of best fit
 - Find and interpret the correlation coefficient

Chapter 3: Systems of Linear Equations and Matrices

3.1 Solving Linear Systems

- Linear Systems in Two Variables
 - Solve systems of equations in two variables by graphing
 - Solve systems of equations in two variables by substitution
 - Solve systems of equations in two variables by addition
 - Identify inconsistent and dependent systems of equations containing two variables, and express the solution of dependent equations
-

- Linear System in Three Variables
 - Determine whether an ordered triple is a solution to a system
 - Solve systems of three equations in three variables
 - Identify inconsistent and dependent systems of equations containing three variables, and express the solution of a system of dependent equations
- Applications of Linear Systems
 - Use systems of equations to investigate profits
 - Write and solve a system of equations in two variables from a word problem

3.2 Solving Linear Systems by the Gauss-Jordan Method

- Solving Systems with Gaussian Elimination
 - Convert between a system of equations and its corresponding augmented matrix
 - Use row operations to solve a system of linear equations in two variables
 - Use row operations to solve a system of linear equations in three variables
 - Use matrices to solve applications of systems of linear equations

3.3 Operations with Matrices

- Addition and Subtraction of Matrices
 - Determine the order of a matrix and describe elements within a matrix
 - Add or subtract matrices
- Multiplication of Matrices
 - Multiply a matrix by a scalar
 - Find the sum or difference of scalar multiples
 - Multiply two matrices

3.4 Matrix Inverses and Determinants

- Determinants of Matrices
 - Find the determinant of a 2x2 matrix
 - Find the determinant of a 3x3 matrix
- Inverse and Identity Matrices
 - Understand the identity matrix and how it relates to the inverse matrix
 - Determine if a matrix is invertible using the determinant
 - Find the inverse of a 2x2 matrix
 - Find the inverse of a 3x3 matrix
- Solving Systems with Inverses
 - Solve a system of linear equations using the inverse of a 2x2 matrix
 - Solve a system of linear equations using the inverse of a 3x3 matrix

3.5 Input-Output Models

- Input-Output Matrices
 - Create an input output matrix for a given application
 - Calculate the amount of commodities produced given an input output matrix and a production matrix
-

- Determine the production matrix that will satisfy a given demand matrix
- Find the production of a commodity in a closed input output model

Chapter 4: Linear Programming - The Graphical Method

4.1 Graphing Linear Inequalities

- Graphs of Linear Inequalities
 - Solve a linear inequality in two variables by graphing
 - Solve a linear system of inequalities by graphing

4.2 Solving Linear Programming Problems Graphically

- Solving Linear Programming Problems Graphically
 - Graph a feasible region given a set of constraints
 - Find the maximum value of an objective function given constraints by graphing

4.3 Applications of Linear Programming

- Applications of Linear Programming
 - Solve application problems using linear programming

Chapter 5: Linear Programming - The Simplex Method

5.1 Slack Variables and the Pivot

- Finding Solutions using Initial Simplex Tableaus
 - Rewrite a linear programming problem using slack variables and create an initial simplex tableau
 - Read a solution from an initial simplex tableau
 - Find a new solution by pivoting an initial simplex tableau

5.2 Maximization and Minimization Problems

- Solving Maximization Problems with the Simplex Method
 - Solve maximization problems using the simplex method
- Transposing a Matrix and Finding the Dual of a Linear Programming Problem
 - Determine the transpose of a matrix
 - Determine the dual of a linear programming problem
- Solving Minimization Problems with Duality
 - Solve minimization problems using the theorem of duality

5.3 Nonstandard Problems

- Solving Nonstandard Problems
 - Solve a nonstandard linear programming problem
 - Solve a nonstandard linear programming application problem
-

Chapter 6: Mathematics of Finance

6.1 Simple Interest

- Simple Interest
 - Calculate simple interest
 - Calculate interest discounts on a discounted loan

6.2 Compound Interest

- Compound Interest
 - Calculate periodically compounded interest
 - Calculate compound interest
 - Calculate continuously compounded interest
 - Calculate effective annual yield

6.3 Annuities, Stocks, and Bonds

- Annuities
 - Calculate the value of an annuity
 - Calculate the payment needed to achieve a determined future value
- Stocks
 - Define stock terminology
 - Read a stock table

6.4 Installment Loans, Amortization, and Credit Cards

- Mortgages and Loans
 - Calculate the monthly payment and interest cost for a mortgage
 - Construct a loan amortization schedule
 - Choose the best installment loan plan
- Credit Cards
 - Recognize key features of credit cards
 - Calculate the average daily balance of a credit card
 - Determine interest to be paid on a card's next billing date

Chapter 7: Logic

7.1 Statements and Logical Connectives

- The Building Blocks of Logic
 - Identify and negate simple statements
 - Identify and negate quantified statements
 - Symbolic Representation of Statements
 - Identify logical connectives and compound statements
 - Represent and/or/not statements in symbolic form and English
 - Conditional Statements
 - Represent conditional statements in symbolic form and English
 - Write biconditional statements in symbolic form and English
 - Represent symbolic statements with parentheses using dominance of connectives
-

7.2 Truth Tables for Negation, Conjunction, and Disjunction

- Introduction to Truth Tables
 - Construct a truth table for a statement with a conjunction and/or a negation and determine its truth value
 - Construct a truth table for a statement with a disjunction and/or a negation and determine its truth value
 - Construct a truth table for a compound statement with a conjunction and disjunction and determine its truth value

7.3 Truth Tables for the Conditional and Biconditional

- Truth Tables for Conditional and Biconditional Statements
 - Construct a truth table for a conditional statement and determine its truth value
 - Construct a truth table for a biconditional statement and determine its truth value
- Self-Contradictions, Tautologies, and Implications
 - Identify self-contradictions, tautologies, and implications

7.4 Equivalent Statements

- Equivalent Statements and De Morgan's Equivalence Laws
 - Determine if two symbolic statements are equivalent using a truth table
 - Determine if two statements given in English are equivalent using a truth table
 - Determine if two statements are equivalent using De Morgan's laws
- Conditional States and Equivalence
 - Convert a disjunction into an equivalent conditional statement
 - Determine if two conditional statements are equivalent

7.5 Symbolic Arguments

- Drawing and Verifying Conclusions
 - Draw a conclusion from a conditional statement
 - Determine if an argument is valid using a truth table
 - Identify and validate the standard forms of arguments

7.6 Euler Diagrams and Syllogistic Arguments

- Euler Diagrams and Syllogistic Arguments
 - Identify syllogistic arguments
 - Represent a syllogistic argument with a Euler diagram
 - Determine if a syllogistic argument is valid with a Euler diagram

7.7 Switching Circuits

- Switching Circuits and Symbolic Logic
 - Convert between symbolic statements and switching circuits
 - Determine conditions for when a lightbulb will be turned on in a switching circuit
 - Determine if two switching circuits are equivalent
-

Chapter 8: Sets and Counting Principles

8.1 Set Concepts

- Introduction to Sets and Set Builder Notation
 - Represent a set using a written description and the roster method
 - Represent a set using set builder notation
- Set Equivalence
 - Identify the cardinal number for a set
 - Determine if two sets are equivalent
 - Determine if two sets are equal
- Types of Sets
 - Identify subsets, universal sets, and empty sets
 - Distinguish between finite and infinite sets
- Subsets and Proper Subsets
 - Identify subsets and proper subsets using set notation
 - Determine the number of subsets and proper subsets in a given set

8.2 Venn Diagrams and Set Operations

- Representing Sets with Venn Diagrams
 - Illustrate the universal set, a set, and complement of a set using a Venn diagram
 - Illustrate two sets using Venn diagram and set notation
- Set Relationships
 - Determine the complement of a set using Venn diagrams and proper set notation
 - Determine the intersection of two sets using Venn diagrams and set notation
 - Determine the union of two sets using Venn diagrams and set notation
- Set Operations
 - Perform operations on sets
 - Find the difference and cartesian product of two sets
 - Use Venn diagrams to find the result of set operations on two sets
 - Determine the cardinal number of a union of two finite sets

8.3 Venn Diagrams with Three Sets and Verification of Equality of Sets

- Construct a Venn Diagram of Three Sets
 - Perform set operations on three sets
 - Represent three sets using Venn diagrams

The Fundamental Counting Principle

- The Fundamental Counting Principle
 - Solve counting problems using the addition principle
 - Solve counting problems using the multiplication principle

8.4 Permutations and Combinations

- Permutations
 - Evaluate an expression with factorials
 - Find the number of permutations of n distinct objects using the multiplication principle
-

- Find the number of permutations of n distinct objects using a formula
- Find the number of permutations of n non-distinct objects
- Combinations
 - Find the number of combinations using the formula
 - Find the number of subsets of a set

Chapter 9: Probability

9.1 Introduction to Probability

- Sample Spaces and Events
 - Determine the sample space of an experiment
 - Determine an event of an experiment
- Fundamentals of Probability
 - Compute the probability of equally likely outcomes
 - Compute the probability of equally likely outcomes in application
- Probability with Permutations and Combinations
 - Compute probability involving permutations
 - Compute probability involving combinations
- The Complement Rule and Probability
 - Use the complement rule to compute probabilities
 - Compute the probability of an event happening at least once
- Odds and Expected Value
 - Compute the expected value of an event
 - Compute odds using probability

9.2 Conditional Probability and Independent Events

- Independent Events
 - Compute the probability of the union of two events
 - Compute the probability of two independent events occurring
- Dependent Events and Conditional Probability
 - Compute the conditional probability of a dependent event occurring
 - Compute the probability of two or more dependent events occurring

9.3 Binomial Probability

- Binomial Experiments
 - Identify a binomial experiment
 - Determine the binomial probability of success in an experiment performed multiple times
 - Calculate expected value for binomial probability

9.4 Bayes' Theorem

- Bayes' Theorem
 - Apply Bayes' theorem to solve an application problem
-

9.5 Random Variables, Probability Distributions and Expected Value

- Random Variables, Probability Distributions, and Expected Value
 - Calculate probability distribution
 - Calculate the expected value of a random variable

Chapter 10: Statistics

10.1 Sampling, Frequency Distributions, and Graphs

- Sampling and Parameters
 - Understand the definitions of population, sampling, statistic, parameter, and data
 - Identify stratified, cluster, systematic, and convenience sampling
 - Identify sampling errors and bias
 - Identify situations in which statistics can be misleading
- Frequency Distributions and Histograms
 - Construct and understand frequency tables for a set of data
 - Create and interpret histograms
 - Create and interpret stem-and-leaf plots

10.2 Measures of Central Tendency and Measures of Dispersion

- Means and Medians
 - Find the mean of a set of data
 - Find the mean from a frequency table
 - Find the median of a set of data
- Modes, Midranges, and Choosing a Measurement
 - Find the mode of a set of data
 - Find the midrange of a set of data
 - Determine whether the mean, median, or mode is the best measure of center for a data set
- Standard Deviation
 - Compute the sample variance and sample standard deviation
 - Interpret the standard deviation of a set of data

10.3 The Normal Distribution, Margins of Error, and Skewness

- The Normal Distribution
 - Understand the notation and interpret the parameters of a normal distribution
 - Compute z-scores and use them to compare values from different data sets
 - Determine if a data set is skewed
 - Percentiles, Quartiles, and Margins of Error
 - Find and interpret percentiles and quartiles of a data set
 - Calculate and interpret margin of error
 - Problem Solving with the Normal Distribution
 - Standardize a normally distributed random variable
 - Calculate the mean and standard deviation of a standard normal distribution
-

Chapter 11: Nonlinear Functions

11.1 Properties of Functions

- Functions and Function Notation
 - Identify domain and range from a set of ordered pairs
 - Determine whether a relation represents a function
- Relations and Functions
 - Determine whether a function is one-to-one
 - Use the vertical line test to identify functions
 - Use the horizontal line test to identify one-to-one functions

11.2 Quadratic Functions

- Characteristics of Parabolas
 - Determine axis of symmetry and vertex of parabolas from a graph
 - Determine x- and y-intercepts of parabolas from a graph
- Graphs of Quadratic Functions
 - Find the direction a parabola opens and its axis of symmetry and vertex from the general form of its equation
 - Identify the axis of symmetry and vertex of a parabola from its equation in standard form
 - Write the equation of a quadratic function given vertex and a point on a graph
 - Write the equation of a quadratic function given intercepts on a graph
 - Write the equation of a quadratic function in standard form given the equation in general form
- Applications of Quadratic Functions
 - Find the domain and range of a quadratic function
 - Determine the maximum and minimum values of quadratic functions
 - Find the x- and y-intercepts of a quadratic function

11.3 Transformations of Functions

- Transformations of Functions
 - Graph functions using vertical and horizontal shifts
 - Graph functions using reflections about the x-axis and the y-axis
 - Graph functions using compressions and stretches
 - Combine transformations

11.4 Polynomial and Rational Functions

- Polynomial Functions
 - Identify power functions and polynomial functions
 - Graph polynomial functions
 - Write a formula for a polynomial function from a graph
 - Determine equation of a polynomial given key information
-

- Asymptotic Behavior of Rational Functions
 - Use arrow notation to describe local behavior and end behavior of rational functions
 - Identify vertical asymptotes and removable discontinuities of rational functions
 - Identify horizontal and slant asymptotes of rational functions
- Graphs and Applications of Rational Functions
 - Find the intercepts of a rational function
 - Graph rational functions
 - Find the equation of a rational function from a graph

11.5 Exponential and Logarithmic Functions

- Identify and Evaluate Exponential Functions
 - Identify exponential functions
 - Evaluate exponential functions
 - Calculate continuous growth and decay
 - Graphing Exponential Functions
 - Graph exponential functions
 - Graph exponential functions using transformations
 - Relate Logarithms and Exponents
 - Convert from logarithmic to exponential form
 - Convert from exponential to logarithmic form
 - Evaluate Logarithmic Expressions
 - Evaluate logarithms with positive integer solutions
 - Evaluate logarithms with negative integer solutions
 - Use common logarithms
 - Use natural logarithms
 - Basic Properties of Logarithms
 - Understand the basic properties of logarithms
 - Use the product rule for logarithms
 - Use the quotient rule for logarithms
 - Use the power rule for logarithms
 - Solve Logarithmic Equations
 - Use the definition of a logarithm to solve logarithmic equations
 - Use logarithm properties and the definition of the logarithm to solve logarithmic equations
 - Use the one-to-one property of logarithms to solve logarithmic equations
 - Applications of Exponential and Logarithmic Functions
 - Model exponential growth
 - Model exponential decay
 - Applied logarithmic models
 - Choose an appropriate model for data
 - Express an exponential model in base e
-

Chapter 12: Markov Chains

12.1 Properties of Markov Chains

- Transitions
 - Identify transition diagrams and transition matrices
 - Create a transition diagram and matrix for a given word problem
- States
 - Find the second state of a system given a transition matrix and initial state
 - Find powers of a transition matrix
 - Solve application problems using powers of transition matrices

12.2 Regular Markov Chains

- Regular Transition Matrices and Stationary Matrices
 - Determine if a transition matrix is regular
 - Find a stationary matrix for a given transition matrix
 - Solve application problems using stationary matrices

12.3 Absorbing Markov Chains

- Absorbing States
 - Find absorbing states given a transition matrix
 - Determine if a transition matrix is for an absorbing Markov chain
 - Write a transition matrix in standard form
- Limiting Matrix
 - Find the limiting matrix for an absorbing Markov chain

Chapter 13: Limits and the Derivative

13.1 Introduction to Limits

- Limits From a Graph or Table
 - Understand the limit of a function and evaluate a limit from a table
 - Evaluate limits graphically
 - Understand the properties of limits
 - Limits Analytically for Continuous and Piecewise Functions
 - Evaluate two-sided limits analytically for continuous functions
 - Evaluate limits analytically for piecewise functions
 - Evaluate limits analytically for absolute value functions
 - Limits Analytically for Functions with Removable Discontinuities
 - Evaluate two-sided limits analytically for rational functions with removable discontinuities by factoring
 - Evaluate two-sided limits analytically for rational functions with removable discontinuities through expansion
 - Evaluate two-sided limits analytically for complex fractions with removable discontinuities
 - Evaluate two-sided limits analytically for rational functions that contain radicals with removable discontinuities
-

13.2 Infinite Limits and Limits at Infinity

- Infinite Limits
 - Evaluate limits analytically for functions with essential discontinuities
- Limits at Infinity
 - Evaluate limits of polynomial functions at infinity
 - Evaluate limits of rational functions at infinity
 - Evaluate limits of radical and exponential functions at infinity

13.3 Continuity

- Continuity and the Intermediate Value Theorem
 - Understand the definition of continuity
 - Understand types of discontinuity in rational functions
 - Understand and apply the intermediate value theorem
- Continuity of Piecewise Functions
 - Determine whether a piecewise function is continuous
 - Determine the value that makes a piecewise function continuous
- Rational and Quadratic Inequalities
 - Solve quadratic inequalities in one variable, graph the solution set, and express the solution set using interval notation
 - Solve inequalities that involve rational expressions, graph the solution sets, and express the solution set using interval notation

13.4 The Derivative

- Secant Lines and Average Rates of Change
 - Find the average rate of change given a function
 - Find the average rate of change given a table or graph
 - Find the average rate of change given a function and variable intervals
- Tangent Lines and Instantaneous Velocities
 - Determine the sign of the slope of a line tangent to a function at a given point
 - Estimate the slope of the line tangent to a point on a curve
 - Estimate the instantaneous rate of change of a function from successively closer approximations
- The Definition of the Derivative
 - Understand the limit definition of the derivative
 - Use the limit definition to find the derivative of a polynomial function
 - Use the limit definition to find the derivative of a rational function
 - Use the limit definition to find the derivative of a function with a radical

13.5 Basic Differentiation Properties

- The Power Rule and the Sum and Difference Rules
 - Use the constant, constant multiple, and power rule for monomials
 - Apply the sum and difference rules to combine derivatives
-

- Use the Power Rule to Explore Tangent Lines
 - Find the equation of the line tangent to a polynomial at a point
 - Determine where a function has a horizontal tangent
 - Determine the points on a function when tangent lines have a given slope

13.6 Differentials

- Differentials and Finding Error
 - Compute a differential
 - Estimate the amount of propagated and relative error using differentials

13.7 Marginal Analysis in Business and Economics

- Marginal Cost and Revenue
 - Compute and interpret marginal cost
 - Compute and interpret revenue and marginal revenue
- Marginal Average Cost and Revenue
 - Compute average cost and revenue
 - Compute and interpret marginal average cost

Chapter 14: Additional Derivative Topics

14.1 Derivatives of Exponential and Logarithmic Functions

- Derivatives of Exponential Functions with Base e
 - Find the derivative of an exponential function with base e
 - Find the derivative of an exponential function with any base
- Derivatives of Natural Log Functions
 - Find the derivative of a natural logarithmic function
 - Use properties of logarithms to find the derivative of a natural logarithmic function
- Derivatives of Logarithmic Functions of Any Base
 - Find the derivative of a logarithmic function that is not base e
 - Use properties of logarithms to find the derivative of a logarithmic function that is not base e
- Logarithmic Differentiation
 - Use logarithmic differentiation
 - Use logarithmic differentiation with all properties of logarithms

14.2 Derivatives of Products and Quotients

- The Product and Quotient Rules
 - Use the product rule to find the derivative of a function in the form $f(x)g(x)$
 - Use the quotient rule to find the derivative of a function in the form $f(x)/g(x)$
 - Use the product rule to find the derivative of a function in the form $f(x)g(x)h(x)$
 - Combine the product and quotient rules with polynomials
-

- The Product and Quotient Rules with Exponential Functions
 - Use product and quotient rules to find the derivative of exponential functions with base e
 - Use product and quotient rules to find the derivative of exponential functions with any base

14.3 The Chain Rule

- Using the Chain Rule
 - Use the chain rule with the power rule
 - Use the chain rule with the product and quotient rules

14.4 Implicit Differentiation

- Use Implicit Differentiation
 - Use implicit differentiation
 - Use implicit differentiation and the product rule
 - Use implicit differentiation to find the equation of a tangent line

14.5 Related Rates

- Related Rates for Volume or Area Problems
 - Use related rates to solve problems involving volume
 - Use related rates to solve problems involving area
- Related Rates in Other Applications
 - Use related rates to solve problems involving distance
 - Use related rates to solve problems involving angles or shadows

14.6 Elasticity of Demand

- Relative Rate of Change and Elasticity of Demand
 - Find the relative and percentage rate of change of a function
 - Compute elasticity of demand
 - Interpret elasticity of demand

Chapter 15: Graphing and Optimization

15.1 First Derivative and Graphs

- First Derivative Test
 - Understand the relationship between the graph of a function and the sign of its derivative
 - Use the first derivative test to find local extrema from a graph
 - Use the first derivative test to find local extrema given a function
 - The Graph of the Derivative Function
 - Estimate the value of a derivative at a point on a graph using a tangent line
 - Determine the open intervals where the first derivative is positive or negative from a graph
 - Determine the graph of the derivative function given the graph of a polynomial function
-

15.2 Second Derivative and Graphs

- Concavity and the Second Derivative Test
 - Determine concavity and find the inflection points from a graph of $f(x)$
 - Determine concavity and find the inflection points given a function
 - Use the second derivative test to find local extrema given a function

15.3 L'Hospital's Rule

- Using L'Hospital's Rule
 - Apply L'Hospital's Rule in the $0/0$ case
 - Apply L'Hospital's Rule in the (infinity/infinity) case
 - Determine when to apply L'Hospital's Rule

15.4 Curve Sketching Technique

- Sketch the Curve of a Function
 - Sketch the graph of a polynomial
 - Sketch the graph of a rational function
 - Sketch the graph of a function with a cusp

15.5 Absolute Maxima and Minima

- Extreme Value Theorem and Absolute Extrema
 - Understand the extreme value theorem
 - Locate local and absolute extrema from a graph
 - Locate critical points using derivatives
 - Locate absolute extrema

15.6 Optimization

- Applied Optimization Problems
 - Maximize or minimize area or volume
 - Minimize travel time
 - Maximize revenue
 - Minimize surface area
- Optimization Problems in the Abstract
 - Maximize the area of an inscribed rectangle
 - Maximize and minimize quantities given an expression with two variables
 - Minimize distance of a function to a point
- Optimization of Lot Size and Quantity
 - Find the economic lot or economic order quantity size which minimizes total cost

Chapter 16: Integration

16.1 Antiderivatives and Indefinite Integrals

- Antiderivatives and the Integral
 - Find the antiderivative of a function
 - Understand integral notation and verify an indefinite integral
-

- Understand the properties of indefinite integrals
- Evaluate indefinite integrals involving constants or powers

16.2 Integration by Substitution

- Substitution and the Power Rule
 - Use substitution to find an indefinite integral with the power rule
 - Use substitution to evaluate a definite integral with the power rule

16.3 Differential Equations; Growth and Decay

- Basics of Differential Equations
 - Verify a solution of a differential equation
 - Identify the order of a differential equation
- Linear Differential Equations
 - Find a general solution to a linear differential equation
 - Find a particular solution to a linear differential equation
- Initial Value Problems
 - Verify a solution to a differential equation initial value problem
 - Solve a differential equation initial value problem
 - Solve applications of differential equation initial value problems
- Creating Direction Fields
 - Create a direction field for a first-order differential equation
 - Sketch a solution curve given a direction field
- Euler's Method
 - Use Euler's method to approximate the solution of a differential equation
- Differential Equations for Growth and Decay
 - Model and solve growth and decay applications with differential equations

16.4 The Definite Integral

- Left and Right Riemann Sums
 - Approximate the area under a curve using left-endpoint approximation
 - Approximate the area under a curve using right-endpoint approximation
 - Midpoint and Trapezoid Rule
 - Approximate the area under a curve using midpoint approximation
 - Approximate the area under a curve using trapezoidal approximation
 - Defining Definite Integrals
 - Explain the terms integrand, limits of integration, and variable of integration, and describe when a function is integrable
 - Evaluate an integral using the definition of the definite integral and left- or right-endpoint approximations
 - Calculating Definite Integrals with a Geometric Approach
 - Use a geometric formula to calculate a definite integral
 - Calculate net signed areas under a line using formulas for area of a triangle
 - Calculate total area under a function using geometric formulas
-

- Properties of the Definite Integral
 - Use the properties of the definite integral

16.5 The Fundamental Theorem of Calculus

- Integrals and Derivatives with the Fundamental Theorem of Calculus
 - Use the Fundamental Theorem of Calculus to find the derivative of an integral function
 - Use the Fundamental Theorem of Calculus and the chain rule to find a derivative
 - Use the Fundamental Theorem of Calculus with two variable limits of integration
- Evaluating Definite Integrals with the Fundamental Theorem of Calculus
 - Evaluate definite integrals with the Fundamental Theorem of Calculus for functions with positive integer exponents
 - Evaluate definite integrals with the Fundamental Theorem of Calculus for functions with rational exponents
 - Evaluate definite integrals with the Fundamental Theorem of Calculus and the power rule by simplifying
- Average Value of a Function
 - Find the average value of a function over an interval

Chapter 17: Additional Integration Topics

17.1 Area Between Curves

- Finding the Area of a Region Bounded by Two Curves
 - Find the area of a region between two linear functions
 - Find the area of a region bounded between a linear function and another function
 - Find the area of a region bounded between two curves
- Finding the Area of Compound Regions
 - Find the area of a region bounded by two functions that cross
 - Find the area of a region bounded above by two different functions
- Applications of Area Between Curves
 - Find and interpret the Gini index

17.2 Volume of Revolution

- Volume Using the Disk Method
 - Use the disk method to find the volume of a solid of revolution around the x-axis with polynomials or roots

17.3 Applications in Business and Economics

- Income Streams
 - Find the total income for a continuous stream
 - Find the present value of a continuous stream
 - Find the future value of a continuous stream
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- Consumer and Producer Surplus
 - Find the consumers' surplus at a certain price level
 - Find the producers' surplus at a certain price level
 - Find the equilibrium price and the consumers' and producers' surplus at that price

17.4 Integration by Parts

- Basic Integration by Parts with Indefinite Integrals
 - Use integration by parts when u and v are given
 - Use integration by parts for indefinite integrals

17.5 Integration Using Tables

- Integration Tables
 - Use a formula from an integration table to evaluate an integral
- Integration with Computer Algebra Systems
 - Use a computer algebra system to evaluate an integral
- Reduction Formulas
 - Use a table with reduction formulas to evaluate an integral

Chapter 18: Multivariable Calculus

18.1 Functions of Several Variables

- Introduction to Multivariable Functions
 - Evaluate a multivariable function
 - Sketch a point in three-dimensional space
 - Graph cross sections of a multivariable function

18.2 Partial Derivatives

- Partial Derivatives of a Function of Two Variables
 - Find the partial derivative of a function of two variables
 - Estimate the partial derivative of a function at a point from a graph or contour map
 - Total Differential
 - Use the differential to approximate the change in a function given the change in the inputs or to calculate maximum error
 - Partial Derivatives of a Function of Three or More Variables
 - Find the partial derivative of a function of three variables
 - Higher Order Partial Derivatives
 - Find the higher order partial derivatives of a function of two variables
 - The Chain Rule for Functions of Several Variables
 - Use the chain rule for one independent variable
 - Use the chain rule for two independent variables
 - Use the generalized chain rule
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18.3 Maxima and Minima

- Critical Points and the Second Derivative Test for Functions of Two Variables
 - Find critical points of a function of two variables
 - Use the second derivative test to classify critical points of a function of two variables
- Absolute Extrema and Applications for Functions of Two Variables
 - Find the absolute extrema of a function of two variables on a closed region
 - Solve maximization and minimization word problems with multiple variables

18.4 Maxima and Minima Using Lagrange Multipliers

- Lagrange Multipliers with One Constraint
 - Use Lagrange multipliers to find maximum and minimum values of a function of two variables with a single constraint
 - Use Lagrange multipliers to find maximum and minimum values of a function of three variables with a single constraint
- Lagrange Multipliers with Two Constraints
 - Use Lagrange multipliers to find maximum and minimum values of a function with two constraints

18.5 Double Integrals over Rectangular Regions

- Iterated Integrals and Properties of Double Integrals
 - Recognize and use some of the properties of double integrals
 - Evaluate a double integral over a rectangular region by writing it as an iterated integral
 - Evaluate a double integral over a rectangular region by reversing the order of integration
- Applications of Double Integrals Over Rectangular Regions
 - Find the volume under a surface
 - Find the average value of a function over a rectangular region

18.6 Double Integrals over More General Regions

- Double Integrals Over Nonrectangular Regions
 - Recognize when a function of two variables is integrable over a general region
 - Evaluate a double integral by computing an iterated integral over a region bounded by two lines and two functions
 - Double Integrals by Decomposing Regions or Changing the Order of Integration
 - Evaluate a double integral over a more complex region by decomposing the region
 - Simplify the calculation of an iterated integral by changing the order of integration
 - Applications of Double Integrals Over General Regions
 - Use double integrals to calculate the area of a general plane region
 - Use double integrals to calculate the volume of a region between two surfaces over a general plane region
 - Find the average value of a function over a general region
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Chapter 19: Trigonometric Functions

19.1 Trigonometric Functions Review

- Angles as Rotations and Radian Measures
 - Identify the measure of positive and negative angles in standard position and the quadrant of the terminal side
 - Convert between degree and radian measure of an angle
 - Understand when two angles are coterminal
- The Six Trigonometric Ratios
 - Use right triangles to evaluate sin, cos, and tan functions
 - Evaluate reciprocal trig functions using right triangles or a sin, cos, or tan function
- Sine and Cosine Values in the First Quadrant
 - Understand sin and cos values on the unit circle
 - Find exact sin and cos values for angles in the first quadrant of the unit circle
- Sine and Cosine Values with Reference Angles and a Calculator
 - Find the reference angle for a given angle
 - Use reference angles to evaluate sin and cos functions
 - Use reference angles to find coordinates on the unit circle
 - Evaluate sin and cos functions with a calculator
- The Other Trigonometric Ratios on the Unit Circle
 - Find the sec, csc, tan, and cot values for angles in the first quadrant of the unit circle
 - Use reference angles to evaluate sec, csc, tan, and cot functions
 - Evaluate trigonometric functions with a calculator
- Use Given Trigonometric Ratios to Find Other Ratios
 - Understand the relationship between the quadrant in which an angle falls and the signs of the trig functions of that angle
 - Use the pythagorean identity
 - Find the values of all trigonometric functions given coordinates on a unit circle
 - Find the values of all trigonometric functions given the value of one trigonometric function
- Characteristics of Sin and Cos Graphs
 - Graph the sin function and understand its properties
 - Graph the cos function and understand its properties
- Applications of Trigonometric Functions
 - Use sinusoidal functions to solve real-world applications

19.2 Derivatives of Trigonometric Functions

- Derivatives with Trigonometric Functions
 - Find the derivative of a function with sine or cosine
 - Use the product or quotient rule to find a derivative with sine or cosine
 - Use the chain rule with trigonometric functions
 - Applications of Trigonometric Derivatives
 - Compute derivatives of trigonometric functions in application problems
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19.3 Integration of Trigonometric Functions

- Integration with Trigonometric Functions
 - Evaluate indefinite integrals involving trigonometric functions
 - Evaluate definite integrals involving trigonometric functions
 - Compute integrals of trigonometric functions in application problems

Chapter 20: Differential Equations

20.1 Separation of Variables

- Finding Differential Equation Solutions using Separation of Variables
 - Find a general solution to a differential equation composed of two polynomials using separation of variables
 - Find a specific solution to a differential equation composed of two polynomials using separation of variables
- Application Problems using Separation of Variables
 - Solve solution concentration problems using separation of variables
 - Solve Newton's law of cooling problems using separation of variables

20.2 First-Order Linear Differential Equations

- Recognizing and Solving First-order Linear Differential Equations
 - Identify first-order linear differential equations
 - Write first-order linear differential equations in standard form
 - Solve a first-order linear differential equation using an integrating factor
- Applications of First-order Linear Differential Equations
 - Solve first-order differential equation problems about compound interest
 - Solve first-order differential equation problems involving equilibrium price

Chapter 21: Taylor Polynomials and Sequences and Series

21.1 Taylor Polynomials

- Taylor and Maclaurin Polynomials
 - Recognize a Taylor series
 - Find the Taylor polynomials for a function at a value

21.2 Taylor Series

- Representing Functions with Taylor and Maclaurin Series
 - Represent a function at a value with a Taylor series and determine the interval of convergence
 - Find the Maclaurin series for a function and show that the series converges

21.3 Operations on Taylor Series

- Finding the Maclaurin Series that Represents a Function
 - Find the Maclaurin series for a trigonometric function
 - Find the Maclaurin series for a logarithmic or exponential function
 - Find a Maclaurin series by differentiating another series
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21.4 Approximations Using Taylor Series

- Estimating Function Values with Taylor and Maclaurin Series
 - Find the Maclaurin polynomials for a function
 - Estimate a function value using Taylor polynomials
 - Determine the error of an estimated function value using Taylor's theorem
 - Estimate a trigonometric function value using Maclaurin polynomials
- Alternating Series and the Alternating Series Test
 - Determine if an alternating series converges or diverges using the alternating series test
 - Estimate the remainder of an alternating series
 - Determine whether a series converges absolutely or conditionally

21.5 Sequences and Series

- Geometric Sequences
 - Find the common ratio of a geometric sequence
 - Write terms of a geometric sequence
 - Write a recursive formula for a geometric sequence
 - Write an explicit formula for a geometric sequence
- Applications of Series
 - Solve application problems with arithmetic series
 - Solve application problems with geometric series
 - Find the equivalent fraction for a repeating decimal
 - Solve an annuity problem
- Finite and Infinite Geometric Series
 - Find the sum of a finite geometric series
 - Determine if the sum of an infinite series is defined
 - Find the sum of an infinite geometric series
- Newton's Method
 - Use Newton's method to approximate the root of a polynomial
 - Use Newton's method to approximate a square root
 - Determine when Newton's method does not work

Chapter 22: Probability and Calculus

22.1 Improper Integrals

- Improper Integrals over Infinite Intervals
 - Evaluate an improper integral over an infinite interval
 - Evaluate an improper integral from negative infinity to positive infinity

22.2 Continuous Random Variables

- Probability Density Functions
 - Understand the properties of probability density functions
 - Compute probability using a continuous probability density function
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- Cumulative Distribution Functions
 - Understand the properties of a cumulative distribution function
 - Find the cumulative distribution function given a probability density function

22.3 Parameters of Continuous Random Variables

- Mean and Median of a Probability Density Function
 - Find the mean of a continuous probability density function
 - Find the median of a continuous probability density function
- Other Parameters of Probability Density Functions
 - Find the variance and standard deviation of a continuous probability density function

22.4 Special Probability Distributions

- Uniform Distribution
 - Compute probability using the uniform distribution
 - Compute the mean, median, and standard deviation of the uniform distribution
 - Exponential Distribution
 - Compute probability using the exponential distribution
 - Compute the mean, median, and standard deviation of the exponential distribution
 - Normal Distribution
 - Understand the notation and interpret the parameters of a normal distribution
 - Compute z-scores and use them to compare values from different data sets
 - Use a table to find probabilities in a normal distribution
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