CALCULUS CURRICULUM

Course 17009

This course, when completed, thoroughly prepares students for taking the Advanced Placement Calculus exam. The course emphasizes infinite series, limits, derivatives, and integration. Practical applications include related rate, maximum and minimum, area, and volume problems.

CALCULUS OUTLINE:

Goals	Skills	Summative Assessments	Time Frame	Main Resources
• Apply and extend the properties of exponents to solve problems with rational exponents • Apply properties of rational and irrational numbers to solve real world or mathematical problems. • Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. • Extend the knowledge of rational functions to rewrite in equivalent forms. • Interpret the effects transformations have on functions and find the inverses of functions. • Interpret the structure of expressions to represent a quantity in terms of its context. • Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. • Interpret functions in terms of the situation they model.	• Use the concept and notation of functions to interpret and apply them in terms of their context. • Write functions or sequences that model relationships between two quantities. • Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. • Construct and compare linear, quadratic and exponential models to solve problems. • Write expressions in equivalent forms to solve problems. • Create and graph equations or inequalities to describe numbers or relationships. • Graph and analyze functions and use their properties to make connections between the different representations.	Mid-year and End of Year Benchmark Assessments,	1-year	Brief Calculus: An Applied Approach ©2013

CALCULUS MAP:

TIME FRAME	BIG IDEAS	CONCEPTS	ESSENTIAL QUESTIONS	STANDARDS	OBJECTIVES	DIFFERENTIATION	ASSESSMENT
Weeks 1-4 Chapter 1: Functions, Limits and Graphs	• Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization. • Data can be modeled and used to make inferences.	1.1 The Cartesian Plane and the Distance Formula 1.2 Graphs of Equations 1.3 Lines in the Plane and Slope 1.4 Functions 1.5 Limits 1.6 Continuity	• How are shape and dimension used to model real world situations? • How can you use shape and dimension to back up your reasoning? • How can properties and theorems help us solve problems?	CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or	1.1 • Plot points in the coordinate plane and read data presented graphically. • Find the distance between two points in a coordinate plane. • Find the midpoints of line segments connecting two points. • Translate points in a coordinate plane. 1,2 • Sketch graphs of equations by hand • Find the x- and y-intercepts of graphs and equations • Write the standard forms of equations of circles • Find the points of intersection of two graphs • Use mathematical models to model and solve real-life problems 1.3 • Use the slop-intercept form of a linear equation to sketch graphs • Find slopes of lines passing through two points • Use the point-slope form to write equations of lines • Find equations of parallel and perpendicular lines	Guided Notes for all students for each lesson. Reduced problem sets (if in IEP) Extended testing time (if in IEP) Small group testing (if in IEP)	Homework Participation Quiz Test

				sequences that model relationships between two quantities. CC.2.2.HS.C.5 Construct and compare linear, quadratic and exponential models to solve problems. CC.2.2.HS.C.6 Interpret functions in terms of the situation they model. CC.2.2.HS.D.10 Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.	• Use linear equations to model and solve real-life problems 1.4 • Decide whether the relationship between two variables is a function • Find the domains and ranges of functions • Combine functions to create other functions • Find inverse functions algebraically 1.5 • Find limits of functions graphically and numerically • Understand the definition of the limit of a function and use the properties of limits to evaluate limits of functions • Evaluate one-sided limits • Recognize unbounded behavior of functions 1.6 • Determine the continuity of functions • Determine the continuity of functions on a closed interval • Use the greatest integer function to model and solve real-life problems • Use compound interest models to solve real-life		

					problems		
Weeks 5-10 Chapter 2: Differentiation	• Derivatives help us analyze the many ways quantities change with respect to each other.	2.1 The Derivative and the Slope of a Graph 2.2 Some Rules for Differentiation 2.3 Rates of Change: Velocity and Marginals 2.4 The Product and Quotient Rule 2.5 The Chain Rule 2.6 Higher-Order Derivatives 2.7 Implicit Differentiation 2.8 Related Rates	• What does the derivative of a function tell us about the relationship the function represents? (Sample answer: Derivatives of functions tell us how quantities in a function change with respect to one another at each instant of their relationship.) • Why do we have rules for differentiation? (Sample answer: Rules for differentiation help us compute complicated calculations with ease. Further, they help us better understand how derivatives work by generalizing.)	CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems. CC.2.1.HS.F.3 Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers. CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions. CC.2.2.HS.D.1	2.1 • Identify tangent lines to a graph at a point. • Approximate the slopes of tangent lines to graphs at points. • Use the limit definitions to find the slopes of graphs at points. • Use the limit definitions to find the derivatives of functions. • Describe the relationships between differentiability and continuity. 2.2 • Find the derivatives of functions using the Constant Rule • Find the derivatives of functions using the Power Rule • Find the derivatives of functions using the Constant Multiple Rule • Find the derivatives of functions using the Sum and Difference Rules • Use derivatives to answer questions about real-life situations 2.3 • Find the average rates of change of functions over intervals • Find the instantaneous rates of change of functions at points • Find the marginal	Guided Notes for all students for each lesson. Reduced problem sets (if in IEP) Extended testing time (if in IEP) Small group testing (if in IEP)	Homework Participation Quiz Test

				Interpret the structure of expressions to represent a quantity in terms of its context. CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms. CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.	revenues, costs, and profits for products 2.4 • Find the derivatives of functions using the Product Rule • Find the derivatives of functions using the Quotient Rule • Use derivatives to answer questions about real-life situations 2.5 • Find derivatives using the Chain Rule • Find derivatives using the General Power Rule • Write derivatives in simplified form • Use derivatives to answer questions about real-life situations • Review the basic differentiation rules for algebraic functions 2.6 • Find higher-order derivatives • Find and use a position function to determine the velocity and acceleration of a moving object 2.7 • Find derivatives explicitly • Find derivatives implicitly • Use derivatives to answer questions about real-life situations 2.8 • Examine related		

					variables • Solve related-rate problems		
Weeks 11-15 Applications of the Derivative	• Understanding changes in relationships can help us make wise decisions. • Manipulating mathematical relationships can help us understand, and make inferences about them.	3.1 Increasing and Decreasing Functions 3.2 Extrema and the First-Derivative 3.3 Concavity and the Second-Derivative Test 3.4 Optimization Problems 3.5 Business and Economics Applications 3.6 Asymptotes 3.7 Curve Sketching: A Summary 3.8 Differentials and Marginal Analysis	• How can characteristics of graphs help us make decisions? (Sample answer: Knowing where functions are increasing or decreasing can help us forecast growth or loss. Finding points of inflection can help us know responsible quantities of money to invest in a business venture. Critical numbers help us identfy important quantities.) • How can optimization help us make the most out of any situation? (Optimization can help us maximize profit or revenue, minimize cost, or materials used to produce a product.)	CC.2.1.HS.F.3 Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays. CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context. CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find	3.1 • Test for increasing and decreasing functions. • Find the critical numbers of functions and find the open intervals on which functions are increasing or decreasing. • Use increasing and decreasing functions to model and solve real-life problems. 3.2 • Recognize the occurrence of relative extrema of functions • Use the First-Derivative Test to find the relative extrema of functions • Find absolute extrema of continuous functions on a closed interval • Find minimum and maximum values of real-life models and interpret the results in context 3.3 • Determine the intervals on which the graphs of functions are concave upward or downward • Find the points of inflection of the graphs of functions • Use the Second Derivative Test to	Guided Notes for all students for each lesson. Reduced problem sets (if in IEP) Extended testing time (if in IEP) Small group testing (if in IEP)	Homework Participation Quiz Test

				the inverses of functions. CC.2.2.HS.C.6 Interpret functions in terms of the situation they model. CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.5 Use polynomial identities to solve problems. CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.	find the relative extrema of functions • Find the points of diminishing returns of input-output models 3.4 Solve real-life optimization problems 3.5 • Solve business and economics optimization problems • Find the price elasticity of demand for demand functions • Recognize basic business terms and formulas 3.6 • Find the vertical asymptotes of functions and find infinite limits • Find the horizontal asymptotes of functions and find limits at infinity • Use asymptotes to answer questions about real-life situations 3.7 • Analyze the graphs of functions • Recognize the graphs of simple polynomial functions 3.8 • Find the differentials of functions • Use differentials in economics to approximate changes in revenue, cost, and		

					profit • Find the differential of a function using differentiation formulas		
Weeks 16-21 Exponential and Logarithmic Functions	• Exponential and logarithmic functions are great for modeling change in biological and financial systems because of the slowly increasing or decreasing rates of change they share with these systems.	4.1: Exponential Functions 4.2: Natural Exponential Functions 4.3: Derivatives of Exponential Functions 4.4: Logarithmic Functions 4.5: Derivatives of Logarithmic Functions 4.6: Exponential Growth and Decay	• Why are exponential and logarithmic functions good for modeling change in biological systems? (Sample answer: Exponential and logarithmic functions increase more and more quickly, or more and more slowly over their domains, much like growth and decay changes in biological systems) • Why are exponential and logarithmic functions good for modeling change in financial systems? (Sample answer: Exponential and logarithmic functions are iterative, and each iteration is based on the value of the iteration before, much like interest in accounts.)	A1.1.1.4.1 Use estimation to solve problems. A1.1.2.1.1 Write, solve and/or apply a linear equation (including problem situations). A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving process (linear equations only). A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only). A1.1.2.2.1 Write and/or solve a system of linear equations (including problem situations) using graphing, substitution and/or elimination (limit systems to 2 linear equations). A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear equations only). A1.1.3.1.1 Write or solve	4.1 • Use the properties of exponents to evaluate and simplify exponential expressions • Sketch the graphs of exponential functions 4.2 • Evaluate and graph functions involving the natural exponential function • Solve compound interest problems • Solve present value problems 4.3 • Find the derivatives of natural exponential functions • Use calculus to analyze the graphs of real-life functions that involve the natural exponential function • Explore the normal probability density function 4.4 • Sketch the graphs of natural logarithmic functions • Use properties of logarithms to simplify, expand, and condense logarithmic expressions • Use inverse properties of exponential and	Guided Notes for all students for each lesson. Reduced problem sets (if in IEP) Extended testing time (if in IEP) Small group testing (if in IEP)	Homework Participation Quiz Test

				compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). A1.1.3.1.2 Identify or graph the solution set to a linear inequality on a number line. A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation (limit to linear inequalities). A1.1.3.2.1 Write and/or solve a system of linear inequalities using graphing (limit systems to 2 linear inequalities). A1.1.3.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear inequalities only). A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph. A1.2.1.1.3 Identify the domain or	logarithmic functions to solve exponential and logarithmic equations • Use properties of natural logarithms to answer questions about real-life situations 4.5 • Find the derivatives of natural logarithmic functions • Find the derivatives of exponential and logarithmic functions involving other bases 4.6 • Use exponential growth and decay to model real-life situations		

				range of a relation (may be presented as ordered pairs, a graph, or a table). A1.2.1.2.1 Create, interpret and/or use the equation, graph or table of a linear function. A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table and equation). A1.2.2.1.1 Identify, describe and/or use constant rates of change. A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems. A1.2.2.1.3 Write or identify a linear equation when given the graph of the line 2 points on the line, or the slope and a point on a line, (Linear equation may be in point-slope, standard and/or slope-intercept form). A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph. A1.2.2.2.1 Draw, find and/or			

				write an equation for a line of best fit for a scatter plot. A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., 10/(x + 3) + 12/(x – 2) = 1 or √(x2 + 21x) = 14). A2.1.3.1.3 Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms). A2.1.3.1.4 Write, solve and/or apply linear or exponential growth or decay (including problem situations). A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., y=4/x, if x doubles, what happens to y?). A2.1.3.2.2 Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r). A2.2.1.1.1		

				Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically. A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20th term). A2.2.1.1.3 Determine the domain, range or inverse of a relation. A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes). A2.2.2.1.1 Create, interpret and/or use the equation, graph or table of a polynomial function (including quadratics). A2.2.2.1.2 Create, interpret and/or use the equation, graph or table of an exponential or logarithmic function (including common and natural logarithms).			

				A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function. A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table and equation). A2.2.2.2.1 Identify or describe the effect of changing parameters within a family of functions (e.g., y = x2 and y = x2 + 3, or y = x2 and y = 3x2). CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.6 Interpret functions in terms of the situation they model. CC.2.2.HS.D.10 Represent, solve and interpret			

				equations/inequalities and systems of equations/inequalities algebraically and graphically. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.			
Weeks 22-26 Chapter 5: Integration and Its Applications	• Integrals provide us with a way to use equations of change to find the equations of the situations that created the change. • Integrals provide us with a way to find areas of strange regions.	5.1: Antiderivatives & Indefinite Integrals 5.2: Integration by Substitution & The General Power Rule 5.3: Exponential and Logarithmic Integrals 5.4: Area and the Fundamental Theorem of Calculus 5.5: The Area of a Region Bounded by two Graphs 5.6: The Definite Integral as the Limit of a Sum	• What is the relationship between finding slopes of tangent lines and finding the area under curves? • What is the relationship between derivatives and integrals? • How is calculus useful in science, business, and other fields?	A1.1.1.4.1 Use estimation to solve problems. A1.1.1.5.2 Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax2+bx+c where a is equal to 1 after factoring out all monomial factors). A1.1.1.5.3 Simplify/reduce a rational algebraic expression. A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving process (linear equations only). A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only). A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation (limit to linear inequalities).	5.1 • Understand the definition of antiderivative and use indefinite integral notation for antiderivatives • Use basic integration rules to find antiderivatives • Use initial conditions to find particular solutions of indefinite integrals • Use antiderivatives to solve real-life problems 5.2 • Use the General Power Rule to find indefinite integrals • Use substitution to find indefinite integrals - Use the General Power Rule to solve real-life problems 5.3 • Use the Exponential Rule to find indefinite integrals - Use the Log Rule to find indefinite Integrals 5.4 • Understand the relationship between area and definite integrals	Guided Notes for all students for each lesson. Reduced problem sets (if in IEP) Extended testing time (if in IEP) Small group testing (if in IEP)	Homework Participation Quiz Test

				A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph. A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table). A1.2.2.1.1 Identify, describe and/or use constant rates of change. A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems. A2.1.2.1.1 Use exponential expressions to represent rational numbers. A2.1.2.1.2 Simplify/evaluate expressions involving positive and negative exponents and/or roots (may contain all types of real numbers - exponents should not exceed power of 10). A2.1.2.1.3 Simplify/evaluate expressions involving	• Evaluate definite integrals to solve marginal analysis problems • Use definite integrals to solve marginal analysis problems • Find the average values of function over closed intervals • Use properties of even and odd functions to help evaluate definite integrals • Find the amounts of annuities 5.5 • Find the areas of regions bounded by two graphs • Find consumer and producer surpluses • Use the areas of regions bounded by two graphs to solve real-life problems 5.6 • Use the Midpoint Rule to approximate definite integrals • Understand the definite integral as the limit of a sum •		

				multiplying with exponents (e.g. x6 * x7 = x13), powers of powers (e.g., (x6)7=x42) and powers of products (2x2)3=8x6 (limit to rational exponents). A2.1.2.1.4 Simplify or evaluate expressions involving logarithms and exponents (e.g. log28 = 3 or log42 = ½). A2.1.2.2.1 Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax2+bx+c where a is not equal to 0). A2.1.2.2.2 Simplify rational algebraic expressions. A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., 10/(x + 3) + 12/(x – 2) = 1 or √(x2 + 21x) = 14). A2.1.3.1.4 Write, solve and/or apply linear or exponential growth or decay (including			

				problem situations). A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., y=4/x, if x doubles, what happens to y?). A2.1.3.2.2 Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r). A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically. A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20th term). A2.2.1.1.3 Determine the domain, range or inverse of a relation. A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes).			

				A2.2.2.1.1 Create, interpret and/or use the equation, graph or table of a polynomial function (including quadratics). A2.2.2.1.2 Create, interpret and/or use the equation, graph or table of an exponential or logarithmic function (including common and natural logarithms). A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function. A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table and equation). A2.2.2.2.1 Identify or describe the effect of changing parameters within a family of functions (e.g., y = x2 and y = x2 + 3, or y = x2 and y = 3x2). CC.2.2.HS.C.2 Graph and analyze functions and use their properties to			

				make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.6 Interpret functions in terms of the situation they model. CC.2.2.HS.D.10 Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.			
Weeks 27-30 Chapter 6: Techniques of Integration	• Integrals provide us with a way to use equations of change to find the equations of the situations that created the change. • Integrals provide us with a way to find areas of strange regions.	6.1: Integration by Parts and Present Value 6.2: Integration Tables 6.3: Numerical Integration 6.4: Improper Integrals	• What is the relationship between finding slopes of tangent lines and finding the area under curves? • What is the relationship between derivatives and integrals? • How is calculus useful in science, business, and other fields?	A1.1.1.4.1 Use estimation to solve problems. A1.1.2.1.1 Write, solve and/or apply a linear equation (including problem situations). A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving process (linear equations only).	6.1 • Use integration by parts to find indefinite and definite integrals • Find the present value of future income 6.2 • Use integration tables to find indefinite and definite integrals • Use reduction formulas to find indefinite integrals • Use integration	Guided Notes for all students for each lesson. Reduced problem sets (if in IEP) Extended testing time (if in IEP) Small group testing (if in IEP)	Homework Participation Quiz Test

				A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only). A1.1.2.2.1 Write and/or solve a system of linear equations (including problem situations) using graphing, substitution and/or elimination (limit systems to 2 linear equations). A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear equations only). A1.1.3.1.1 Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). A1.1.3.1.2 Identify or graph the solution set to a linear inequality on a number line. A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation (limit to linear inequalities). A1.1.3.2.1 Write and/or solve a system of linear inequalities using	tables to solve real-life problems 6.3 • Use the Trapezoidal Rule to approximate definite integrals • Use Simpson's Rule to approximate definite integrals • Analyze the sizes of the errors when approximating definite integrals with the Trapezoidal Rule and Simpson's Rule 6.4 • Recognize improper integrals • Evaluate improper integrals with infinite limits of integration • Use improper integrals to solve real-life problems • Find the present value of a perpetuity		

				graphing (limit systems to 2 linear inequalities). A1.1.3.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear inequalities only). A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph. A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table). A1.2.1.2.1 Create, interpret and/or use the equation, graph or table of a linear function. A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table and equation). A1.2.2.1.1 Identify, describe and/or use constant rates of change. A1.2.2.1.2			

				Apply the concept of linear rate of change (slope) to solve problems. A1.2.2.1.3 Write or identify a linear equation when given the graph of the line 2 points on the line, or the slope and a point on a line, (Linear equation may be in point-slope, standard and/or slope-intercept form). A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph. A1.2.2.2.1 Draw, find and/or write an equation for a line of best fit for a scatter plot. A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $10/(x + 3) + 12/(x – 2) = 1$ or $\sqrt{(x2 + 21x)} = 14$). A2.1.3.1.3 Write and/or solve a simple exponential or logarithmic equation (including common			

				and natural logarithms). A2.1.3.1.4 Write, solve and/or apply linear or exponential growth or decay (including problem situations). A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., y=4/x, if x doubles, what happens to y?). A2.1.3.2.2 Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r). A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically. A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20th term). A2.2.1.1.3 Determine the domain, range or inverse of a relation. A2.2.1.1.4 Identify and/or determine the characteristics of an			

				exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes). A2.2.2.1.1 Create, interpret and/or use the equation, graph or table of a polynomial function (including quadratics). A2.2.2.1.2 Create, interpret and/or use the equation, graph or table of an exponential or logarithmic function (including common and natural logarithms). A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function. A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table and equation). A2.2.2.2.1 Identify or describe the effect of changing parameters within a family of functions			

				(e.g., y = x2 and y = x2 + 3, or y = x2 and y = 3x2). CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.6 Interpret functions in terms of the situation they model. CC.2.2.HS.D.10 Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.			
Weeks 31-36 Chapter 7: Functions of Several Variables	• Mathematical statements can be justified through deductive and inductive reasoning and proof. • Some geometric relationships can be described and explored as functional	1. Write trig function in terms of other trig functions 2. Write trig functions in terms of other trig functions and simplify. 3. Add Fractions involving trig functions. 4. Multiply trig functions using the distributive property. 5. Simplify a square	• What do we mean when we want tan written in terms of sin? • Write tan in terms of sin. • How do you find the least common denominator for expressions? • Given an expression explain the process of proving an identity.	A1.1.1.4.1 Use estimation to solve problems. A1.1.2.1.1 Write, solve and/or apply a linear equation (including problem situations). A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving	7.1 • Plot points in space • Find distances between two points in space and find midpoints of line segments in space • Write the standard forms of the equations of spheres and find the centers and radii of spheres • Sketch the	Guided Notes for all students for each lesson. Reduced problem sets (if in IEP) Extended testing time (if in IEP) Small group testing (if in IEP)	Homework Participation Quiz Test

	relationships. • Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.	root expression as much as possible later substituting a trig function in for the missing variable. 6. Show that the following statement is true by transforming the left side into the right side. 7. Show that the following statement is true by transforming the left side into the right side.	• Chapter 1 Review • What do we call the point where two rays come together to form an angle? • In your own words, define complementary angles. • In your own words, define supplementary angles. • Why is it important to recognize 30-60-90 and 45-45-90 triangles? • What is the unit circle? • What is the equation of a unit circle? • Explain how the distance formula and the Pythagorean Theorem are related. • What is meant by standard position for an angle? • Given any angle, explain how to find another angle that is co-terminal with it. • Find the six trigonometric functions of theta, if theta is an angle in standard position and the point (x,y) is a point on the terminal side of theta. • If r is the distance from the origin to the point (x.y), state the sic rations, or definitions, corresponding to	process (linear equations only). A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only). A1.1.2.2.1 Write and/or solve a system of linear equations (including problem situations) using graphing, substitution and/or elimination (limit systems to 2 linear equations). A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear equations only). A1.1.3.1.1 Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). A1.1.3.1.2 Identify or graph the solution set to a linear inequality on a number line. A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation (limit to linear inequalities). A1.1.3.2.1	coordinate plane traces of surfaces 7.2 • Sketch planes in space • Draw planes in space with different numbers of intercepts • Classify quadric surfaces in space 7.3 • Evaluate functions of several variables • Find the domains and ranges of functions of two variables • Read contour maps and sketch level curves of functions of two variables • Use functions of several variables to answer questions about real-life situations 7.4 • Find the first partial derivatives of functions of two variables • FInd the slopes of surfaces in the x- and y- directions and use partial derivatives to answer questions about real-life situations • Find the partial derivatives of functions of several variables • Find higher-order partial derivatives 7.5 • Understand the relative extrema of functions of two variables		

			the six trig functions. • Find the sine and cosine of 45 degrees. • Find the sine, cosine, and tangent of 270 degrees. • State the reciprocal identities for csc, sec, and cot. • State the equivalent forms of the reciprocal identities for sin, cos, and tan. • State the ratio identities for tan and cot. • State the three Pythagorean identities. • What do we mean when we want tan written in terms of sin? • Write tan in terms of sin. • How do you find the least common denominator for expressions? • Given an expression explain the process of proving an identity.	Write and/or solve a system of linear inequalities using graphing (limit systems to 2 linear inequalities). A1.1.3.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear inequalities only). A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph. A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table). A1.2.1.2.1 Create, interpret and/or use the equation, graph or table of a linear function. A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table and equation). A1.2.2.1.1 Identify, describe	• Use the First-Partials Test to find the relative extrema of functions of two variables • Use the Second-Partials Test to find the relative extrema of functions of two variables • Use relative extrema to answer questions about real-life situations 7.6 • Understand the Method of Legrange Multipliers • Use Legrange Multipliers to solve constrained optimization problems 7.7 • Find the sum of the squared errors for mathematical models • Find the least squares regression lines for data 7.8 • Evaluate double integrals • Use double integrals to find the areas of regions 7.9 • Use double integrals to find the volumes of solids • Use double integrals to find the average values of real-life models		

				and/or use constant rates of change. A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems. A1.2.2.1.3 Write or identify a linear equation when given the graph of the line 2 points on the line, or the slope and a point on a line, (Linear equation may be in point-slope, standard and/or slope-intercept form). A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph. A1.2.2.2.1 Draw, find and/or write an equation for a line of best fit for a scatter plot. A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $10/(x + 3) + 12/(x – 2) = 1$ or $\sqrt{(x2 + 21x)} = 14$). A2.1.3.1.3 Write and/or solve a			

				simple exponential or logarithmic equation (including common and natural logarithms). A2.1.3.1.4 Write, solve and/or apply linear or exponential growth or decay (including problem situations). A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., y=4/x, if x doubles, what happens to y?). A2.1.3.2.2 Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r). A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically. A2.2.1.1.2 Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20th term). A2.2.1.1.3 Determine the domain, range or inverse of a relation. A2.2.1.1.4			

				Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes). A2.2.2.1.1 Create, interpret and/or use the equation, graph or table of a polynomial function (including quadratics). A2.2.2.1.2 Create, interpret and/or use the equation, graph or table of an exponential or logarithmic function (including common and natural logarithms). A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function. A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table and equation). A2.2.2.2.1 Identify or describe			

				the effect of changing parameters within a family of functions (e.g., y = x2 and y = x2 + 3, or y = x2 and y = 3x2). CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations. CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities. CC.2.2.HS.C.6 Interpret functions in terms of the situation they model. CC.2.2.HS.D.10 Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.			