

**COURSE OF STUDY
MATHEMATICS**

Name of Course: Honors Calculus

Length of Course: 180 Days

Course Number: 342

Type of Offering: Honors

Grade Level: 12

Credit Value: Honors credit

Prerequisite/s: Honors PreCalc/Teacher Recommendation

Minutes: 7200

COURSE DESCRIPTION:

This class is a review of the theory covered in pre-calculus along with the study of the basic topics of derivatives and integrals. The pace of the class will be slower than Advanced Placement Calculus.

TEXTBOOK (if applicable)

Title: Calculus: Graphical, Numerical, Algebraic

Publisher: Pearson/Prentice-Hall

Copyright: 2003

OTHER RESOURCES: Textbook Ancillary Materials

Teacher Generated Materials

Calculator Applications

Computer Software Applications

Internet-Based Applications

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>The following Standards apply to all units and sections:</p> <p>2.2.11. A. Develop and use computation concepts, operations and procedures on real numbers in problem solving situations.</p> <p>2.2.11. F. Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.</p> <p>2.5.11.A. Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non- routine and multi- step problems.</p> <p>2.5.11.C. Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p>2.8.11.H. Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets, and other software.</p> <p>2.8.11.S. Analyze properties and relationships of functions (linear, polynomial, rational, trigonometric, exponential, and logarithmic).</p> <p>Standards and Anchors specific to the section indicated:</p>			<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice- Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts e.g., “How to Solve It” by Polya, “The Education of TC Mits” by Lieber, along with other calculus reference books Internet, as available</p>	

<p>M11.D.3.2.1 Apply the formula for the slope of a line to solve problems (formula given on reference sheet).</p> <p>M11.C.3.1.2 Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).</p> <p>M11.D.3.2.2 Given the graph of the line, 2 points on the line, or the slope and a point on a line, write or identify the linear equation in point-slope, standard and/or slope-intercept form.</p> <p>M11.D.3.2.3 Compute the slope and/or y-intercept represented by a linear equation or graph.</p> <p>M11.D.2.1.3 Write, solve and/or apply a linear equation (including problem situations).</p> <p>M11.D.3.1.2 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?).</p> <p>M11.E.4.2.1 Draw, find and/or write an equation for a line of best fit for a scatter plot.</p> <p>M11.E.4.2.2 Make predictions using the equations or graphs of best-fit lines of scatter plots.</p>	<p>Section:</p> <p>1.) Lines</p> <p>a) Increments</p> <p>b) Slope of a line</p> <p>c) Parallel and Perpendicular lines</p> <p>d) Equations of lines</p> <p>1) Standard form</p> <p>2) Point-Slope form</p> <p>3) Two-Point form</p> <p>4) Slope-Intercept form</p> <p>e) Applications and Linear Regression</p>	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p> <p>Although this chapter is a review of Precalculus material, the concepts will be presented in depth. The teacher will present an overview of the material and the students will then complete the assignments given, with individual and small group help, as required. Emphasis will be made on the concepts to be used throughout the course, such as simplifying complex fractions, along with utilization of the graphing calculators for</p>		<p>The students will do problems, both teacher-assigned items and those of their own interests.</p>
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<p>M11.D.4.1.1 Match the graph of a given function to its table or equation. 2.9.11.J. Analyze figures in terms of the kinds of symmetries they have. M11.D.2.1.4 Write and/or solve systems of equations using graphing, substitution and/or elimination (limit systems to 2 equations).</p> <p>M11.A.2.2 Use exponents, roots and/or absolute value to solve problems. 2.11.11.C. Graph and interpret rates of growth/ decay. M11.D.2.1.5 Solve quadratic equations using factoring (integers only – not including completing the square or the Quadratic Formula). M11.D.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. M11.A.1.1.2 Express numbers and/or simplify expressions using scientific notation (including numbers less than 1). M11.A.1.1.3 Simplify square roots. (e.g., $\sqrt{24} = 2\sqrt{6}$)</p> <p>M11.D.1.1.2 Determine if a relation is a function given a set of points or a graph. 2.8.11.E. Use equations to represent curves such as lines, circles, ellipses, parabolas and hyperbolas.</p>	<p>2.) Functions, and Graphs a) Functions b) Domains and Ranges c) Viewing and interpreting graphs d) Even and odd functions - symmetry e) Piecewise defined functions f) Absolute Value function g) Composition of functions</p> <p>3.) Exponential Functions a) Exponential growth b) Exponential decay c) Applications and exponential regression d) The number e, Euler’s number</p> <p>4.) Parametric Equations a) Relations b) Circles c) Ellipses d) Lines and other curves – parametrization</p>	<p>linear, exponential, and logarithmic regression techniques and other uses.</p> <p>Throughout the chapter, the teacher will lecture on the material while randomly questioning students to check for understanding.</p>		
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<p>M11.D.1.1.3 Identify the domain, range or inverse of a relation (may be presented as ordered pairs or a table).</p> <p>M11.C.1.1.2 Identify and/or use the properties of arcs, semicircles, inscribed angles and/or central angles.</p> <p>M11.B.2.1 Use and/or compare measurements of angles.</p> <p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p> <p>M11.D.2.2.3 Simplify algebraic fractions.</p> <p>2.10.11. A. Use graphing calculators to display periodic and circular functions; describe properties of the graphs.</p> <p>2.8.11.Q. Represent functional relationships in tables, charts, and graphs.</p> <p>2.8.11.T. Analyze and categorize functions by their characteristics.</p>	<p>5.) Functions and Logarithms</p> <ul style="list-style-type: none"> a) One-to-One Function b) Inverses c) Finding inverses d) Logarithmic functions e) Properties of logarithms f) Applications and logarithmic regression <p>6.) Trigonometric Functions</p> <ul style="list-style-type: none"> a) Radian measure b) Graphs of trigonometric functions c) Periodicity d) Even and odd trigonometric functions e) Transformations of trigonometric functions f) Applications g) Inverse trigonometric functions 	<p>The teacher will review the material to date via a question and answer period allowing students to demonstrate understanding, and re-teaching where necessary.</p>		<p>The students will complete the chapter assessment, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
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Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>2.5.11.C. Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p>M11.D.2.2.2 Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax^2+bx+c where a is not equal to 0).</p> <p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p> <p>2.8.11.H. Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets, and other software.</p> <p>2.8.11.J. Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p> <p>2.8.11.S. Analyze properties and relationships of functions (linear, polynomial, rational, trigonometric, exponential, and logarithmic).</p>	<p>Section:</p> <p>1.) Rates of Change and Limits</p> <ol style="list-style-type: none"> Average and Instantaneous Speed Definition of limit Properties of Limits One-sided limits and two-sided limits The Sandwich Theorem <p>2.) Limits Involving Infinity</p> <ol style="list-style-type: none"> Finite limits as $x \rightarrow \pm\infty$ Sandwich Theorem revisited Infinite limits as $x \rightarrow a$ End behavior models “Seeing” limits as $x \rightarrow \pm\infty$ <p>3.) Continuity</p> <ol style="list-style-type: none"> Continuity at a point Continuous functions Algebraic combinations Composites 	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p> <p>This chapter is the foundation chapter for the concepts of differential calculus. Thus, completion of the assignments must be verified by the teacher, both for the content and correctness of the students’ work.</p>	<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice-Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts Internet, as available</p>	<p>The students will do problems, both teacher-assigned items and those of their own interests.</p> <p>The students will complete the chapter</p>

<p>2.10.11. A. Use graphing calculators to display periodic and circular functions; describe properties of the graphs. M11.C.3.1.2 Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet).</p>	<p>e) Intermediate Value Theorem for Continuous Functions</p> <p>4.) Rates of Change and Tangent Lines</p> <p>a) Average Rates of Change b) Tangent to a curve c) Slope of a curve d) Normal to a curve e) Speed revisited</p>	<p>The teacher will review the material to date via a question and answer period requiring students to provide all information, and re – teaching where necessary.</p>	<p>assessment, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
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Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p> <p>2.8.11.E. Use equations to represent curves such as lines, circles, ellipses, parabolas and hyperbolas.</p> <p>2.8.11.J. Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p> <p>2.8.11.N. Solve linear, quadratic, and exponential equations both symbolically and graphically.</p> <p>2.8.11.Q. Represent functional relationships in tables, charts, and graphs.</p> <p>2.8.11.S. Analyze properties and relationships of functions (linear, polynomial, rational, trigonometric, exponential, and logarithmic).</p> <p>2.8.11.T. Analyze and categorize functions by their characteristics.</p>	<p>Section:</p> <p>1.) Derivative of a Function</p> <ol style="list-style-type: none"> Definition of Derivative Notation Relationships between the graphs of f and f' Graphing the derivative from data One-sided derivatives <p>2.) Differentiability</p> <ol style="list-style-type: none"> How $f'(a)$ might fail to exist Differentiability implies local linearity Derivatives on a calculator Differentiability implies continuity Intermediate Value Theorem for Derivatives <p>3.) Rules for Differentiation</p> <ol style="list-style-type: none"> Positive integer powers, multiples, sums and differences Products and quotients Negative integer powers of x Second and higher order derivatives 	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p> <p>This chapter presents the concepts of finding derivatives, which are the basics of differential calculus. Thus, completion of the assignments must be verified by the teacher, both for the content and correctness of the students' work.</p>	<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice-Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts Internet, as available</p>	<p>The students will do problems, both teacher-assigned items and those of their own interests.</p>

<p>S11.C.3.1.3 Explain that acceleration is the rate at which the velocity of an object is changing.</p>	<p>4.) Velocity and Other Rates of Change a) Instantaneous rates of change b) Motion along a line c) Sensitivity to change d) Derivatives in economics</p>	<p>The teacher will review the material to date via a question and answer period requiring students to provide all information, and re-teaching where necessary.</p>		<p>The students will complete the assessment on the first five sections of Chapter 3, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
<p>2.10.11. A. Use graphing calculators to display periodic and circular functions; describe properties of the graphs.</p>	<p>5.) Derivatives of Trigonometric Functions a) Derivative of the sine function b) Derivative of cosine function c) Simple harmonic motion d) Jerk e) Derivatives of the other basic trigonometric functions</p>			
<p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p>	<p>6.) The Chain Rule a) Derivative of a composite function b) The “Outside-inside” rule c) Repeated use of the chain rule d) Slopes of parametrized curves e) Power Chain Rule</p>			
<p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p>	<p>7.) Implicit Differentiation a) Implicitly defined functions b) Lenses, tangents and normal lines c) Derivatives of higher order d) Rational powers of differentiable functions</p>			
<p>2.10.11. A. Use graphing calculators to display periodic and circular functions; describe properties of the graphs.</p>	<p>8.) Derivatives of Inverse Trigonometric Functions a) Derivatives of inverse</p>			

<p>2.11.11.C. Graph and interpret rates of growth/ decay.</p>	<p>functions b) Derivative of the arcsine c) Derivative of the arctangent d) Derivative of the arcsecant e) Derivatives of the other three</p> <p>9.) Derivatives of Exponential and Logarithmic Functions a) Derivative of e^x b) Derivative of a^x c) Derivative of $\ln x$ d) Derivative of $\log_a x$ e) Power Rule of Arbitrary Real Powers</p>	<p>The teacher will review the material to date via a question and answer period requiring students to provide all information, and re-teaching where necessary.</p>		<p>The students will complete the chapter assessment, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
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Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>2.11.11.A. Determine maximum and minimum values of a function over a specified interval.</p> <p>2.11.11.B. Interpret maximum and minimum values in problem situations.</p> <p>M11.D.3.1.1 Identify, describe and/or use constant or varying rates of change.</p> <p>2.5.11.B. Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.11.11.A. Determine maximum and minimum values of a function over a specified interval.</p> <p>2.11.11.B. Interpret maximum and minimum values in problem situations.</p>	<p>Section:</p> <p>1.) Extreme Values of Functions</p> <ol style="list-style-type: none"> Absolute (global) extreme values Local (relative) extreme values Finding extreme values <p>2.) Mean Value Theorem</p> <ol style="list-style-type: none"> Mean Value Theorem Physical interpretation Increasing and decreasing functions Other consequences <p>3.) Connecting f' and f'' with the Graph of f</p> <ol style="list-style-type: none"> The First Derivative Test for local extrema Concavity Points of inflection The Second Derivative Test for local extrema Learning about functions from derivatives 	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p>	<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice-Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts Internet, as available</p>	<p>The students will do problems, both teacher-assigned items and those of their own interests.</p>

<p>2.5.11.C. Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p>2.5.11.D. Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.8.11.B. Give examples of patterns that occur in data from other disciplines.</p> <p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non- routine problem situations.</p> <p>2.8.11.G. Analyze and explain systems of equations, systems of inequalities and matrices.</p> <p>2.8.11.R. Create and interpret functional models.</p> <p>M11.C.1.3.1 Identify and/or use properties of congruent and similar polygons or solids.</p> <p>M11.B.2.2 Use and/or develop procedures to determine or describe measures of perimeter,</p>	<p>4.) Modeling and Optimization (summarize)</p> <ul style="list-style-type: none"> a) Examples from business and industry b) Examples from mathematics c) Examples from economics d) Modeling discrete phenomena with differentiable functions <p>5.) Linearization and Newton’s Method (summarize)</p> <ul style="list-style-type: none"> a) Linear approximation b) Newton's method c) Differentials d) Estimating change with differentials e) Absolute, relative and percentage change f) Sensitivity to change <p>6.) Related Rates (summarize)</p> <ul style="list-style-type: none"> a) Related rate equations b) Solution strategy 			<p>The students will be required to write a Fairy-Tale or other such story in which related rates is directly involved in the resolution</p>
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<p>circumference, area, surface area and/or volume. (May require conversions within the same system.) M11.A.3.2.1 Use estimation to solve problems. M11.A.2.1.1 Solve problems using operations with rational numbers including rates and percents (single and multi-step and multiple procedure operations) (e.g., distance, work and mixture problems, etc.). M11.A.2.1.2 Solve problems using direct and inverse proportions. M11.A.2.1.3 Identify and/or use proportional relationships in problem solving settings.</p> <p>2.8.11.Q. Represent functional relationships in tables, charts, and graphs. 2.8.11.R. Create and interpret functional models. 2.10.11.A. Use graphing calculators to display periodic and circular functions; describe properties of the graphs. 2.10.11.B. Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem. 2.11.11.A. Determine maximum</p>	<p>c) Simulating related motion</p>	<p>The teacher will review the material to date via a question and answer period requiring students to provide all information, and re – teaching where necessary.</p>		<p>of the story line.</p> <p>The students will complete the chapter assessment, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
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Course Honors Calculus

Grade Level 12

Unit of Study Unit 4: Applications of Derivatives

Instructional Time 1440 Minutes

and minimum values of a function over a specified interval. 2.11.11.B. Interpret maximum and minimum values in problem situations.				
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Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>2.11.11.D. Determine sums of finite sequences of numbers and infinite geometric series.</p> <p>2.11.11.E. Estimate areas under curves using sequences of areas .</p> <p>2.5.11.B. Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.8.11.B. Give examples of patterns that occur in data from other disciplines.</p> <p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p> <p>2.8.11.J. Demonstrate the connection between algebraic equations and inequalities and the geometry of</p>	<p>Section:</p> <p>1.) Estimating with Finite Sums</p> <ol style="list-style-type: none"> Distance traveled Rectangular Approximation Method (RAM) Volume of a sphere Cardiac output <p>2.) Definite Integrals</p> <ol style="list-style-type: none"> Riemann Sums Terminology and notation of integration Definite integral and area Constant functions Integrals on a calculator (FNINT) Discontinuous integrable functions <p>3.) Definite Integrals and Antiderivatives</p> <ol style="list-style-type: none"> Properties of definite integrals Average value of a function Mean Value Theorem for Definite Integrals Connecting differential and integral calculus <p>4.) Fundamental Theorem of Calculus (summarize)</p> <ol style="list-style-type: none"> Fundamental Theorem, Part 1 	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p>	<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice-Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts Internet, as available</p>	<p>The students will do problems, both teacher-assigned items and those of their own interests.</p>

<p>relations in the coordinate plane. 2.8.11.N. Solve linear, quadratic, and exponential equations both symbolically and graphically. 2.8.11.Q. Represent functional relationships in tables, charts, and graphs.</p> <p>2.8.11.R. Create and interpret functional models. 2.8.11.S. Analyze properties and relationships of functions (linear, polynomial, rational, trigonometric, exponential, and logarithmic). 2.11.11.D. Determine sums of finite sequences of numbers and infinite geometric series. 2.11.11.E. Estimate areas under curves using sequences of areas .</p>	<p>b) Graphing the function $\int_a^x f(t) dt$ c) Fundamental Theorem, Part 2 d) Area connection e) More applications</p> <p>5.) Trapezoidal Rule a) Trapezoidal approximations b) Other algorithms c) Error analysis</p>	<p>The teacher will review the material to date via a question and answer period requiring students to provide all information, and re – teaching where necessary.</p>		<p>The students will complete the chapter assessment, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
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Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>2.5.11.B. Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.5.11.D. Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p> <p>2.8.11.N. Solve linear, quadratic, and exponential equations both symbolically and graphically.</p> <p>2.11.11.C. Graph and interpret rates of growth/ decay.</p>	<p>Section:</p> <p>1.) Antiderivatives and Slope Fields</p> <ol style="list-style-type: none"> Solving initial value problems Antiderivatives and indefinite integrals Properties of indefinite integrals Applications <p>2.) Integration by Substitution</p> <ol style="list-style-type: none"> Power Rule in Integral Form Trigonometric integrands Substitution in indefinite integrals Substitution in definite integrals Separable differential equations <p>3.) Integration by Parts</p> <ol style="list-style-type: none"> Product Rule in Integral Form: $\int u dv = uv - \int v du$ Repeated use Solving for the unknown integral Tabular integration <p>4.) Exponential Growth and Decay (summarize)</p>	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p>	<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice-Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts Internet, as available</p>	<p>The students will do problems, both teacher-assigned items and those of their own interests.</p>

<p>2.8.11.Q. Represent functional relationships in tables, charts, and graphs. 2.8.11.R. Create and interpret functional models. 2.8.11.S. Analyze properties and relationships of functions (linear, polynomial, rational, trigonometric, exponential, and logarithmic).</p> <p>2.11.11.C. Graph and interpret rates of growth/ decay. 2.8.11.T. Analyze and categorize functions by their characteristics.</p> <p>2.10.11.A. Use graphing calculators to display periodic and circular functions; describe properties of the graphs. 2.11.11.C. Graph and interpret rates of growth/ decay. 2.11.11.D. Determine sums of finite sequences of numbers and infinite geometric series.</p>	<p>a) Law of Exponential Change b) Continuously compounded interest c) Radioactivity d) Newton’s Law of Cooling (optional) e) Resistance proportional to velocity (optional)</p> <p>5.) Population Growth a) Exponential model b) Logistic growth model c) Logistic regression</p> <p>6.) Numerical Methods (summarize) a) Euler’s Method b) Numerical solutions c) Graphical solutions d) Improved Euler’s Method</p>	<p>The teacher will review the material to date via a question and answer period requiring students to provide all information, and re – teaching where necessary.</p>		<p>The students will complete the chapter assessment, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
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Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>2.5.11.B. Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>2.11.11.D. Determine sums of finite sequences of numbers and infinite geometric series.</p> <p>2.11.11.E. Estimate areas under curves using sequences of areas .</p> <p>2.5.11.D. Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.8.11.D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities, and matrices to model routine and non-routine problem situations.</p>	<p>Section:</p> <p>1.) Integral as Net Change</p> <ol style="list-style-type: none"> Linear motion revisited General strategy Consumption over time Net change from data Work <p>2.) Areas in the Plane</p> <ol style="list-style-type: none"> Area between curves Area enclosed by intersecting curves Boundaries with changing functions Integrating with respect to y Saving time with geometry formulas <p>3.) Volumes</p> <ol style="list-style-type: none"> Volume as an integral square cross sections Circular cross sections Cylindrical shells Other cross sections <p>4.) Lengths of Curves</p> <ol style="list-style-type: none"> A sine wave Length of a smooth curve Vertical tangents, corners, and cusps (optional) 	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p>	<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice-Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts Internet, as available</p>	<p>The students will do problems, both teacher-assigned items and those of their own interests.</p> <p>The students will complete the chapter</p>

<p>2.8.11.J. Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p> <p>2.8.11.N. Solve linear, quadratic, and exponential equations both symbolically and graphically.</p> <p>2.8.11.Q. Represent functional relationships in tables, charts, and graphs.</p> <p>2.8.11.R. Create and interpret functional models.</p>	<p>5.) Applications from Science and Statistics (summarize)</p> <ul style="list-style-type: none"> a) Work revisited b) Fluid force and fluid pressure c) Normal probabilities 	<p>The teacher will review the material to date via a question and answer period requiring students to provide all information, and re-teaching where necessary.</p>		<p>assessment, consisting of both items from the textbook materials and teacher created materials. The test will include an open-ended item as well.</p>
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Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>2.5.11.C. Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p>2.5.11.D. Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p> <p>2.6.8.F. Use scientific and graphing calculators and computer spreadsheets to organize and analyze data.</p> <p>2.8.11.C. Use patterns, sequences and series to solve routine and non-routine problems.</p> <p>2.8.11.H. Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets, and other software.</p> <p>2.8.11.J. Demonstrate the connection between algebraic equations and</p>	<p>Section:</p> <p>1.) L'Hôpital's Rule</p> <ol style="list-style-type: none"> Indeterminate Form $0/0$ Indeterminate Forms ∞/∞, $\infty \cdot 0$, $\infty - \infty$ Indeterminate forms 1^∞, 0^0, ∞^0 <p>2.) Relative Rates of Growth (summarize)</p> <ol style="list-style-type: none"> Comparing rates of growth Order and Oh-notation (Optional) Sequential versus binary search <p>3.) Improper Integrals</p> <ol style="list-style-type: none"> Infinite limits of integration The integral $\int_1^\infty dx/x^p$ Integrands with infinite discontinuities Tests for convergence and divergence Applications <p>4.) Partial Fractions and Integral Tables</p> <ol style="list-style-type: none"> Partial fractions 	<p>For each of the sections, the teacher will lecture on the material while randomly questioning students to check for understanding.</p> <p>The teacher will review the material to date via a question and answer period</p>	<p>Textbook: <u>Calculus: Graphical, Numerical, Algebraic</u>, by Finney, et al., Pearson/Prentice-Hall, © 2003</p> <p>Chalkboard and Chalk Notebooks Teacher Notes Graphing Calculators Supplemental Texts Internet, as available</p>	<p>The students will do problems, both teacher-assigned items and those of their own interests.</p> <p>The students will complete the chapter assessment, consisting of both items from the textbook materials and</p>

Course Honors Calculus

Grade Level 12

Unit of Study Unit 8: L'Hôpital's Rule, Improper Integrals, and Partial Fractions

Instructional Time 560 Minutes

inequalities and the geometry of relations in the coordinate plane. 2.8.11.N. Solve linear, quadratic, and exponential equations both symbolically and graphically. 2.8.11.R. Create and interpret functional models.	b) General description of the method c) Integral tables d) Trigonometric substitutions	requiring students to provide all information, and re – teaching where necessary.		teacher created materials. The test will include an open-ended item as well.
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