

Math 3A – Instructional Objectives and Student Learning Outcomes

The goals of this course are to provide students with the basic knowledge of differential calculus and to introduce them to integral calculus in preparation for Analytic Geometry and Calculus II.

Learning Objectives Students enrolled in this course will:	Student Learning Outcomes Students that successfully complete this course will be able to:
1. Learn to find and use limits of functions.	a. Find the limit of a function using the Limit Laws. b. Use the formal definition of limit to establish the limit of linear and quadratic functions. c. Find infinite limits and limits at infinity. d. Use limits to determine vertical and horizontal asymptotes of the graph of a function. e. Use the definition of continuity to determine if a function is continuous.
2. Learn to find the derivatives of elementary algebraic functions and trigonometric functions.	a. Find the derivative of elementary algebraic functions and trigonometric functions using the definition of derivative. b. Find the derivative elementary algebraic functions and trigonometric functions using the differentiation formulas. c. Find the derivative of a function using implicit differentiation. d. Use the Chain Rule correctly. e. Solve related rates application problems. f. Find linear approximations and differentials of functions and use them to solve application problems.
3. Learn to use derivatives for graphing algebraic and trigonometric functions and to solve optimization problems.	a. Find intervals of increase and decrease and local extreme values of elementary algebraic functions and trigonometric functions. b. Find intervals of concavity and points of inflection of elementary algebraic functions and trigonometric functions. c. Classify local extreme values using the first and second derivative tests. d. Sketch the graph of algebraic and trigonometric functions by putting together all the information obtained using derivatives and limits. e. Find absolute extreme values of a function using the Extreme Value Theorem. f. Apply the Mean Value Theorem. g. Solve optimization problems. h. Use the Intermediate Value Theorem and Newton's method to locate and approximate the zeros of a function.
4. Learn to evaluate definite and indefinite integrals and use them in applications.	a. Evaluate a definite integral using a Riemann sum. b. Approximate the value of a definite integral using right endpoint and left endpoint approximations. c. Evaluate a definite integral using the Fundamental Theorem of Calculus.

	<ul style="list-style-type: none">d. Find the indefinite integral of elementary algebraic functions and trigonometric functions.e. Use the Substitution Rule to evaluate both definite and indefinite integrals.f. Find the area between two curves.g. Compute volumes of revolution using cross sections, disks, washers, and cylindrical shells.h. Find the average value of a function.
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