

Calculus and Vectors, University Preparation

Course Outline

Unit #1 - Rates of Change

Demonstrate an understanding of rate of change by making connections between average rate of change over an interval and instantaneous rate of change at a point, using the slopes of secants and tangents and the concept of the limit.

Unit #2 – Derivatives

Graph the derivatives of polynomial functions, and make connections between the numeric, graphical, and algebraic representations of a function and its derivative. Verify graphically and algebraically the rules for determining derivatives; apply these rules to determine the derivatives of polynomial, rational, and radical functions, and simple combinations of functions; and solve related problems.

Unit #3 – Curve Sketching

Make connections, graphically and algebraically, between the key features of a function and its first and second derivatives, and use the connections in curve sketching. Solve problems, including optimization problems, that require the use of the concepts and procedures associated with the derivative, including problems arising from real-world applications and involving the development of mathematical models.

Unit #4 – Derivatives of Sinusoidal Functions

Apply the derivative rules to determine the derivatives of sinusoidal functions and solve related problems.

Unit #5 – Exponential and Logarithmic Functions

Apply the derivative rules to determine the derivatives of exponential and logarithmic functions and solve related problems.

Unit #6 – Geometric Vectors

Demonstrate an understanding of vectors in two-space and three-space by representing them algebraically and geometrically and by recognizing their applications. Cartesian Vectors
Perform operations on vectors in two-space and three-space, and use the properties of these operations to solve problems, including those arising from real-world applications.

Unit #7 – Lines and Planes

Distinguish between the geometric representations of a single linear equation or a system of two linear equations in two-space and three-space, and determine different geometric configurations of lines and planes in three-space. Represent lines and planes using scalar, vector, and parametric equations, and solve problems involving distances and intersections.

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Note: The order of the units of study may change due to student needs and resources available during the course. Homework is assigned on a regular basis. Homework completion and regular attendance are key to being successful in this course.

Textbooks and Resources:

- Calculus and Vectors, McGraw-Hill Ryerson
- Printed Packages provided by the teacher

Tutoring Club