BAKER COLLEGE
STUDENT LEARNING OUTCOMES

MTH1510 Calculus I
4 Semester Credit Hours

Student Learning Outcomes and Enabling Objectives

1. Evaluate the limit, or one-sided limit, of a function at infinity or a given point.
    a. Apply the properties of limits.
    b. Use the epsilon-delta definition of a limit to show that a number is the limit of a function at a point.
    c. Apply the Squeeze Theorem.
    d. Apply the Intermediate Value Theorem.
    e. Evaluate the continuity of a function at a point and on an interval.
    f. Identify points of discontinuity.
    g. Locate asymptotes.

2. Compute the derivative of a function, including trigonometric, polynomial, exponential and logarithmic functions.
    a. Find the equation of a line tangent to a function at a given point.
    b. Determine the differentiability of a function.
    c. Apply the power, sum, difference, product, quotient, and chain rules to find the derivative of a function.
    d. Compute higher order derivatives.
    e. Compute the derivative implicitly.

3. Interpret the derivative of a function.
    a. Use derivatives to evaluate position, velocity, and acceleration.
    b. Solve problems involving related rates.
    c. Compute instantaneous rates of change.
    d. Recognize indeterminate forms.
    e. Apply L'Hôpital's Rule.
4. Determine properties of functions using calculus techniques.
    a. Identify the extrema of a function.
    b. Classify the extrema of a function using the first derivative test.

c. Apply Rolle's Theorem and the Mean Value Theorem.
d. Determine points of inflection.
e. Determine the concavity of a function using the second derivative test.
f. Locate asymptotes.
g. Sketch the graph of a function.
h. Solve optimization problems.
i. Apply Newton's Method to find the zeros of a function and to solve simultaneous nonlinear equations.
j. Estimate a function using linear approximations and differentials.

5. Find the area under a curve using integration.
    a. Apply summation properties to approximate the area under a curve.
    b. Explain the antiderivative.
    c. Solve first degree differential equations.
    d. Apply the Fundamental Theorems of Calculus, basic integration formulas, pattern recognition, and change of variables to integrate functions.
    e. Apply integration methods to solve problems involving definite and indefinite integral.
6. Apply the Fundamental Theorems of Calculus.
    a. Describe the Fundamental Theorems of Calculus.
    b. Identify applications of the Fundamental Theorems of Calculus.
    c. Apply Simpson's Rules and the Trapezoidal Rule.

Big Ideas and Essential Questions

Big Ideas

- Limits
- Derivatives of trigonometric, polynomial, exponential and logarithmic functions
- Interpret derivatives
- Properties of functions
- Differentiation & Integration
- Fundamental Theorem of Calculus

Essential Questions

1. How do limits help me describe function behavior at infinity or a point for which the function value can't be calculated?
2. How do I find the derivative of trigonometric, polynomial, exponential and logarithmic functions?
3. How does interpreting derivatives relate to rates of change?

4. What can I learn about a function by studying the derivatives?
5. How can calculus help me determine the area between curved functions?
6. What is the Fundamental Theorem of Calculus?

These SLOs are not approved for experiential credit.

Effective: Fall 2024