MATH 151: Calculus for Management

Department of Mathematics
Millersville University

Description

MATH 151 (Calculus for Management) is a 4-credit course for students in business and industrial technology.

This course may be taken for general education credit (G2).

Prerequisites

A grade of C- or better in MATH 101, or Math Placement.

Objectives

Students will become proficient in applying the techniques of calculus to problem-solving situations. In light of this, students will be able to:

•   solve problems involving the derivative, its definition, its relationship to limits, and its application to finding slopes of curves and rates of change;

•   solve problems involving the fundamental formulas and techniques of differential calculus;

•   solve problems involving the definite integral, its relationship to limits, and its application to finding areas;

•   differentiate and integrate functions including polynomial, rational, exponential and logarithmic functions;

•   solve problems involving the development of applications of the theoretical underpinnings of calculus;

•   and explain the notions of limits and continuity, some key formulas of calculus, and some major theorems of calculus.

Assessment

Students will demonstrate their understanding through work in class, homework, and examinations.

Use of Technology

Students are required to have access to a graphing calculator for this course. The department currently supports the TI 83, 84, and 86.

Calculators (and technology in general) should enhance learning, and students should learn to use them appropriately. Instructors may at times prohibit the use of calculators with symbolic math capabilities, such as the TI-89 or TI-92. Instructors may prohibit the use of calculators on exams, as they deem appropriate.

• Graphical and numerical evidence should be presented as an aid to conjecture and comprehension. They should not substitute for rigorous proof, nor should they replace the acquisition of appropriate symbolic manipulation skills.

• Students should understand the limitations of technology (for example, by seeing situations in which graphical or numerical evidence is unreliable or inconclusive).

In MATH 151, students should learn to use calculators to:

• Graph functions in rectangular coordinates.

• Explore functional relationships through the use of numerical tables (e.g. using the Table function on the TI calculators).

• Approximate finite and infinite sums (e.g. using the Sum Seq function on the TI calculators).

• Approximate integrals numerically (e.g. using the fnInt function on the TI calculators).

• Approximate solutions to non-linear equations in one variable.

Topics

1. Functions, Lines, and Graphs

This material should be reviewed as necessary.

2. Limits, Continuity, and Derivatives

Limits
Slopes of curves, rates of change, and derivatives
Velocity and marginal analysis

3. Differentiation Rules

Basic rules: Constants, sums, and power

The Product and Quotient Rules
The Chain Rule
Higher-order derivatives
Implicit differentiation (Optional topic)

4. Applications of Differentiation

Related Rates
Local and absolute maxima and minima
Increasing and decreasing functions; the First Derivative Test
Concavity; the Second Derivative Test
Asymptotes
Graphing
Applications of maxima and minima
Applications to business and economics
Differentials (Optional topic)

5. Calculus of Exponential and Logarithmic Functions

Exponential functions and their derivatives
Logarithmic functions and their derivatives
Exponential growth and decay

6. Antiderivatives and Definite Integrals

Antiderivatives: Basic rules
Antiderivatives for exponentials and logarithms
Definite integrals and the Fundamental Theorem
The area between curves
Integration by substitution
Integration by parts

Text

Geoffrey C. Berresford and Andrew M. Rockett, Applied Calculus, 6th Edition

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