

**MOREHOUSE COLLEGE
DEPARTMENT OF MATHEMATICS**

**BUSINESS CALCULUS
MATH 160**

Prerequisite: Completion of Finite Mathematics (Math 110) or Pre-calculus (Math 120) with a “C” or better or approved math placement into this class

Text: Calculus and Its Applications, (8th edition, 2004) by Marvin L. Bittinger, Pearson/Addison Wesley

Recommended Supplement: Student Solution Manual

Coverage: Chapters 1-7

COURSE OUTLINE

CHAPTER 1. Functions, Graphs, and Models

- 1.2. Functions and Models
- 1.3. Domain and Range
- 1.4. Slope and Linear Functions
- 1.5. Other Functions and Models

CHAPTER 2. Differentiation

- 2.1. Limits and Continuity: Numerically and Graphically
- 2.2. Limits: Algebraically
- 2.3. Average Rates of Change
- 2.4. Differentiation Using Limits of Difference Quotients
- 2.5. Differentiation Techniques: The Power and Sum-Difference Rules
- 2.6. Instantaneous Rate of Change
- 2.7. Differentiation Techniques: The Product and Quotient Rules
- 2.8. The Chain Rule
- 2.9. Higher Order Derivatives

CHAPTER 3. Applications of Differentiation

- 3.1. Using First Derivative to Find Maximum and Minimum Values and Sketch Graphs
- 3.2. Using Second Derivative to Find Maximum and Minimum Values and Sketch Graphs
- 3.3. Graph Sketching: Asymptotes and Rational Functions
- 3.4. Using Derivative to Find Absolute Maximum and Minimum Values
- 3.5. Maximum-Minimum Problems: Business and Economic Applications
- 3.6. Differentials
- 3.7. Implicit Differentiation and Related Rates

CHAPTER 4. Exponential and Logarithmic Functions

- 4.1. Exponential Functions
- 4.2. Logarithmic Functions
- 4.3. Applications: The Uninhibited Growth Model
- 4.4. Applications: Decay
- 4.5. The Derivatives of a^x and $\log_a x$
- 4.6. An Economic Application: Elasticity of Demand

CHAPTER 5. Integration

- 5.1. Integration
- 5.2. Area and Definite Integrals
- 5.3. Limits of Sums and Accumulations
- 5.4. Properties of Definite Integrals
- 5.5. Integration Techniques: Substitution

5.6. Integration Techniques: Integration by Parts

CHAPTER 6. Applications of Integration

- 6.1. An Economic Application: Consumer's Surplus and Producer's Surplus
- 6.2. Applications of The Models $\int P_0 e^{kt} dt$ and $\int P_0 e^{-kt} dt$
- 6.3. Improper Integrals
- 6.4. Probability
- 6.5. Probability: Expected Value; The Normal Distribution

CHAPTER 7. Function of Several Variables

- 7.1. Functions of Several Variables
- 7.2. Partial Derivatives
- 7.3. Higher-Order Partial Derivatives
- 7.6. Constrained Maximum and Minimum Values: Lagrange Multipliers
- 7.7. Multiple Integration

BEHAVIORAL OBJECTIVES

After successfully completing this course, the students should be able to perform the following tasks:

- Demonstrate an understanding of the fundamental theorems and ideas of calculus;
- Show knowledge of the standard rules of differentiation and apply these rules to polynomial functions and also to rational, exponential, and logarithmic functions;
- Show knowledge of the rules of integration and apply these rules to polynomial functions and also to rational, exponential, and logarithmic functions;
- Apply techniques of the differential and integral calculus to functions of two (or more) variables;
- Solve optimization problems (maxima or minima) involving functions of one and two variables; and,
- Use the techniques and concepts of calculus in the solution of selected problems from business and economics.