DISCRETE MATHEMATICS

Session 1

Egi Safitri, S.Mat., M.Si
Institut Informatika dan Bisnis Darmajaya, Bandar Lampung

2024

Course Contract

- **Attendance**: 75% from 16 meetings.
- **Tardiness**: Max. 10 minutes late.
- **Active participation in class**.
- **Dress Code**: Neat and polite, following campus regulations.
- **Cellphones** should be turned off or set to silent.
  1. Men: Collared shirts/T-shirts, wearing shoes.
  2. Women: Blouses, modest, and wearing shoes.
- **Assessment**: Midterm, Final Exam, Assignments, and Class Participation.

Table of Contents

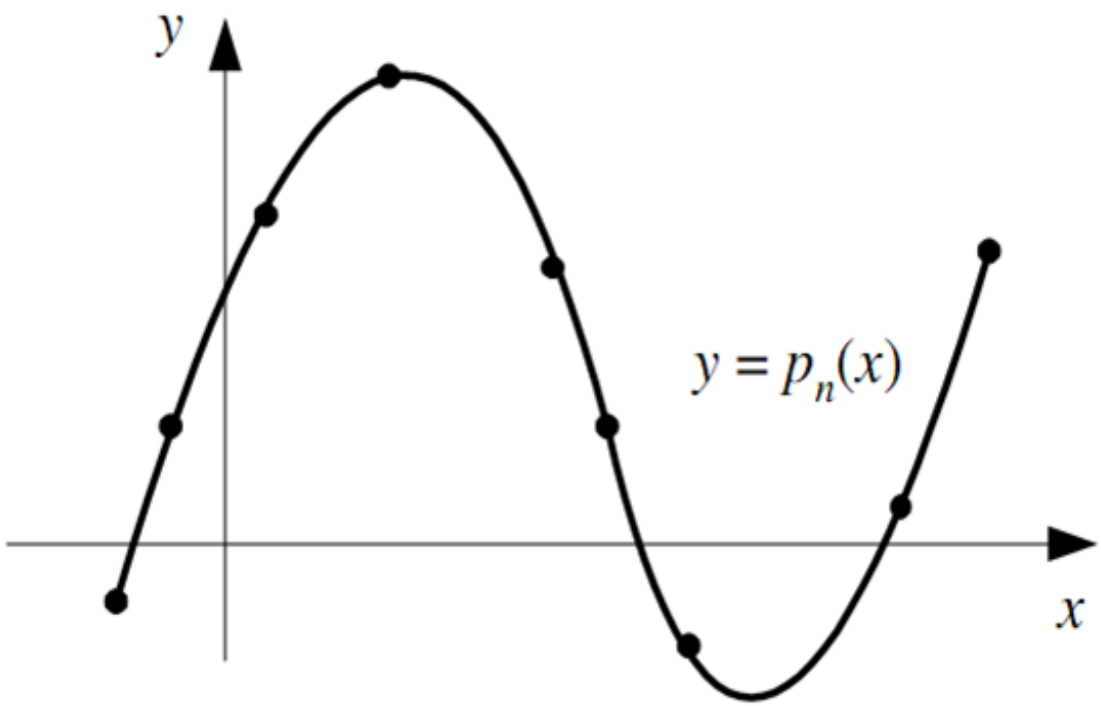
What is Discrete Mathematics?

- **Discrete Mathematics**: A branch of mathematics that studies discrete objects.
- What does **discrete** mean?
- An object is discrete if:
  - It consists of a finite number of distinct elements, or
  - Its elements are unconnected.

  Example: the set of integers.
- Opposite of discrete: **continuous**. Example: the set of real numbers.

[Rosen, 2012]

Discrete vs Continuous



Topics Overview

1. Logic and Reasoning
2. Sets
3. Relations, Functions, and Matrices
4. Mathematical Induction
5. Combinatorics and Discrete Probability
6. Graph Theory

Examples of Problems in Discrete Mathematics

- How many different ways are there to arrange books on a shelf?

Examples of Problems in Discrete Mathematics

- How many different ways are there to arrange books on a shelf?
- How many ways can a committee be selected from a group of people?

Examples of Problems in Discrete Mathematics

- How many different ways are there to arrange books on a shelf?
- How many ways can a committee be selected from a group of people?
- How to find the shortest route between two cities on a road map?

Examples of Problems in Discrete Mathematics

- How many different ways are there to arrange books on a shelf?
- How many ways can a committee be selected from a group of people?
- How to find the shortest route between two cities on a road map?
- How to express union, intersection, and difference operations between sets?

Examples of Problems in Discrete Mathematics

- How many different ways are there to arrange books on a shelf?
- How many ways can a committee be selected from a group of people?
- How to find the shortest route between two cities on a road map?
- How to express union, intersection, and difference operations between sets?
- Is the statement "If the weather is sunny, then I will go to the park" true or false?

Benefits of Learning Discrete Mathematics

Understanding Fundamental Concepts

Understand the basic concepts in mathematics, including logic, set theory, integers, and combinatorics. This provides a solid foundation for further study.

Benefits of Learning Discrete Mathematics

Understanding Fundamental Concepts

Understand the basic concepts in mathematics, including logic, set theory, integers, and combinatorics. This provides a solid foundation for further study.

Applications in Computer Science

Discrete Mathematics is the foundation of computer science. Algorithms, data structures, and graph theory are extensively used in software development.

Benefits of Learning Discrete Mathematics

Problem-Solving Skills

Discrete Mathematics teaches analytical and critical thinking, valuable for decision-making, project management, and scientific research.

Benefits of Learning Discrete Mathematics

Problem-Solving Skills

Discrete Mathematics teaches analytical and critical thinking, valuable for decision-making, project management, and scientific research.

Applications in Information Security

Discrete Mathematics plays a crucial role in cryptography, protecting sensitive data and ensuring online communication security.

Objectives of Learning Discrete Mathematics

1. **Mathematical reasoning**: Understand and form mathematical arguments (Topics: logic).

Objectives of Learning Discrete Mathematics

1. **Mathematical reasoning**: Understand and form mathematical arguments (Topics: logic).
2. **Combinatorial analysis**: Calculate or enumerate objects (Topics: combinatorics).

Objectives of Learning Discrete Mathematics

1. **Mathematical reasoning**: Understand and form mathematical arguments (Topics: logic).
2. **Combinatorial analysis**: Calculate or enumerate objects (Topics: combinatorics).
3. **Discrete structures**: Work with discrete structures.

Objectives of Learning Discrete Mathematics

1. **Mathematical reasoning**: Understand and form mathematical arguments (Topics: logic).
2. **Combinatorial analysis**: Calculate or enumerate objects (Topics: combinatorics).
3. **Discrete structures**: Work with discrete structures.
4. **Algorithmic thinking**: Solve problems by specifying algorithms.

Objectives of Learning Discrete Mathematics

1. **Mathematical reasoning**: Understand and form mathematical arguments (Topics: logic).
2. **Combinatorial analysis**: Calculate or enumerate objects (Topics: combinatorics).
3. **Discrete structures**: Work with discrete structures.
4. **Algorithmic thinking**: Solve problems by specifying algorithms.
5. **Applications and modeling**: Apply discrete mathematics to various fields.

THANK YOU!!

See you in the next meeting!!

References

Kenneth H. Rosen (2012)

Discrete Mathematics and its Application, Seventh Edition

McGraw-Hill xviii.