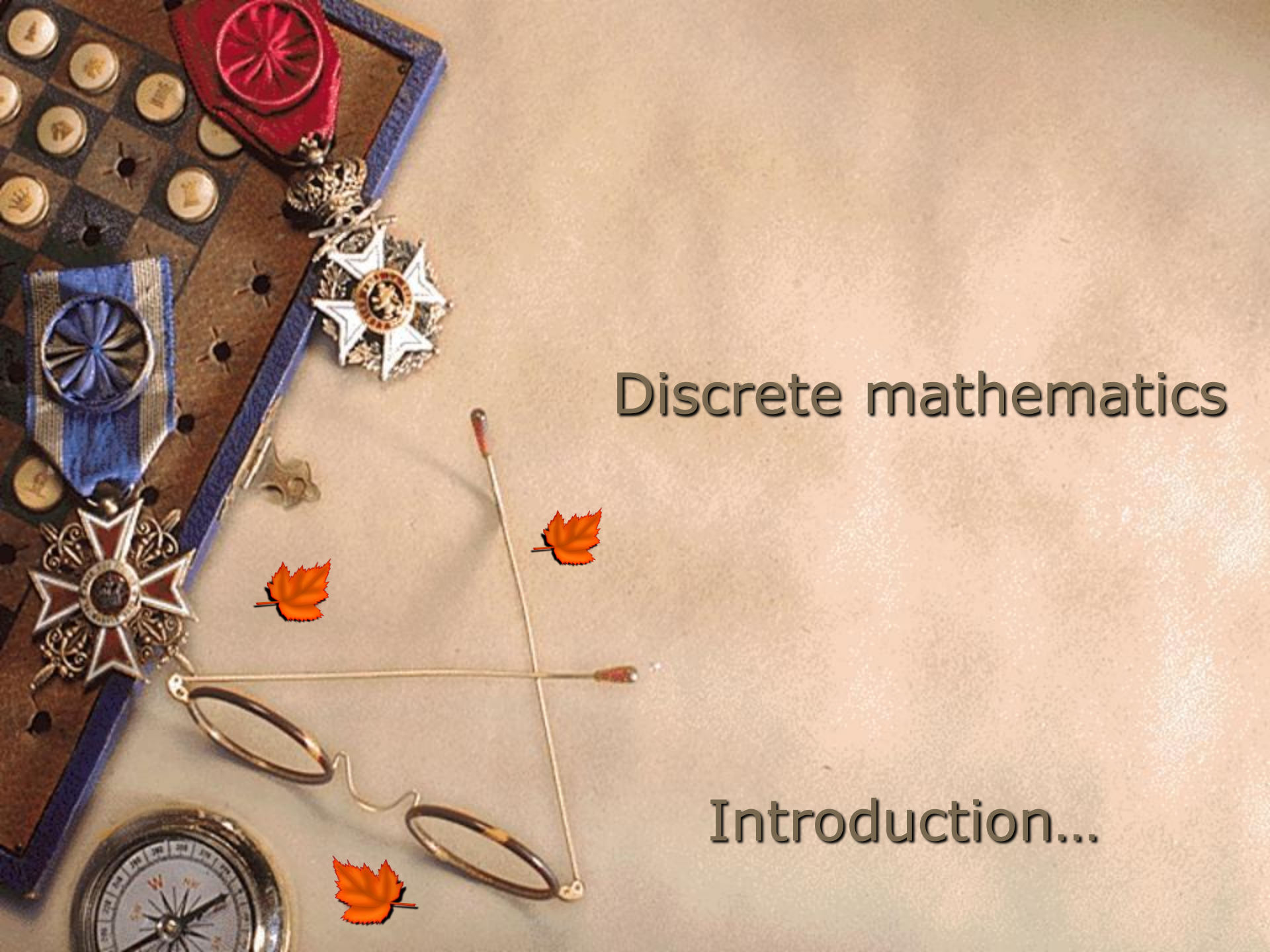


Discrete mathematics

Introduction…

Rizoan Toufiq

Assistant Professor
Department of Computer Science & Engineering
Rajshahi University of Engineering & Technology

Discrete mathematics

- **Course No.:** CSE 2101
- **Course Title:** Discrete Mathematics
- **Prerequisite: None** (√CSE 1101 & √ CSE 1201)
- **Contact hours/week:** 3
- **Credits:** 3.00

Course Description

- Propositional Logic &Proof Techniques
  - 1st -3rd Cycle – (Total 9 Classes)
- Set
- Relation
- Function
  - 4th -6th Cycle – (Total 9 Classes)
- Number Theory
- Introduction to counting
  - 7th -9th Cycle - (Total 9 Classes)
- Introduction to graphs
  - 10th -12th Cycle - (Total 9 Classes)

Grading

- **Quizzes/Class Test:** 20 Marks*
  - (3 best out of 4 quizzes/class tests may be taken for awarding grade)
- **Homework's/Attendance:** 8 Marks*
- **Semester Exam:** 72 Marks

* - We reserve the right to change the above grading scheme.

Homework's

- A new homework is released and is then due after 9 days.
- No grade will be given to homework submitted **afterwards**.
- Homework solutions should be written and submitted individually.

Referred Books

- **Kenneth H. Rosen** - Discrete Mathematics and its Applications, Tata McGraw-Hill. (**7th Edition**)
- **Eric Lehman, F. Thomson Leighton, Albert R. Meyer** - Mathematics for Computer Science.
- **Rnald L. Graham, Donald E. Knuth and Oren Patashnik** – Concrete Mathematics.
- **S. G. Telang** – Number Theory.
- Other…

Sessional Based on CSE 2101

- **Course No.:** CSE 2102
- **Course Title:** Sessional Based on CSE 2101
- **Prerequisite: None** (√CSE 1102 & √ CSE 1202)
- **Contact hours/week: 3.00**
- **Credits:** 1.5

Sessional Based on CSE 2101

Module No	Topics	Chapter*
01	The Foundations: Logic and Proof	01
02	Basic Structures: Sets, Functions, Sequences and Sum	02
03	The Fundamentals: Algorithms, the Integers and Matrices	03 & 04
04	Induction and Recursion	05
05	Counting	06
06	Advanced Counting Techniques	08
07	Relation	09
08	Graph	10

*Extra:

Module No	Topics	Chapter*
09	Discrete Probability	07
10	Trees ×	11
11	Boolean Algebra	12
12	Modeling Computation	13

*** Ref: Kenneth H. Rosen** - Discrete Mathematics and its Applications, Tata McGraw-Hill. (**7th Edition**)

Grading

- **Quiz Test:** 20 Marks*
- **Homework's/Attendance:** 8 Marks*
- **Others:** 47 Marks*
-

	Marks Distribution
Lab Report (Individual)*	20
Lab Performance(Individual)* **Example:** **Average Performance(Every Lab) – 17** **Viva – 10 (Average)**	27
Total	47

* - We reserve the right to change the above grading scheme.

Attendance

Roll No	Name	1D								
1603001	…	√								
1603002	…									
1603003	…	√								
1603004	…	√								

.
.
.
.

1603059		√								
1603060										

In Lab

- Individual
  - Lab Report
  - Books
  - Papers
  - Pens
  - **Laptop* (if individual PC/LAPTOP is not available)**

Note: Side talk or Noise Not Allowed

Class Resources

Web Link:

https://goo.gl/28B8HF

Query???

$$\sqrt{1+\sqrt{2+\sqrt{3+\sqrt{4....}}}}$$

$$\exists_{x\in\Re}\exists_{y\in\Re}(x=y)=?$$

$$\sum_{x=1}^{\infty}x=?$$

$$\sum_{x=1}^{\infty}\frac{1}{x}=?$$

$$\forall_{x}(\Re\mid x)=?$$

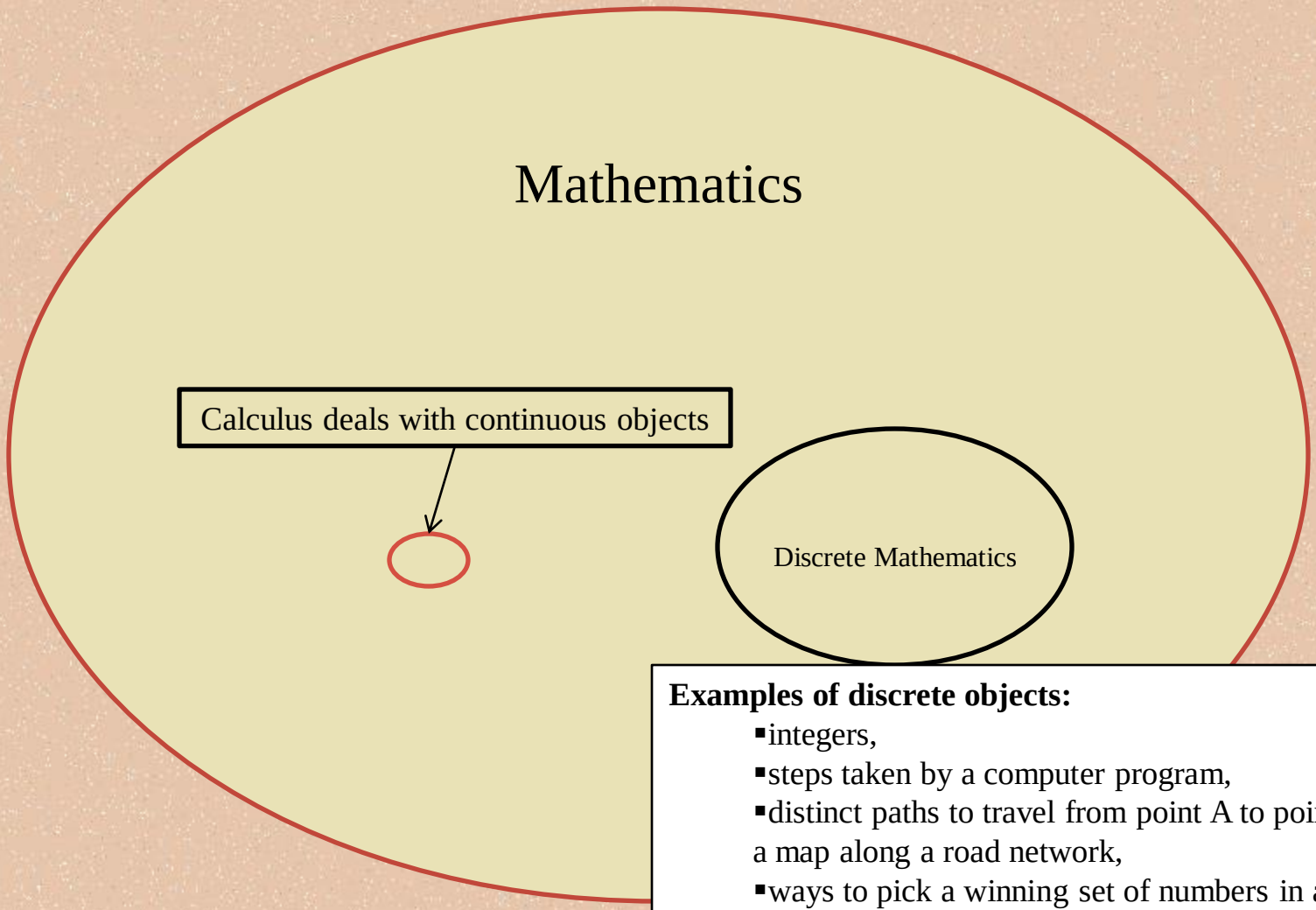
$$\exists_{x\in\Re}\exists_{y\in\Re}(x=y)=?$$

$$\sqrt{1+\sqrt{2+\sqrt{3+\sqrt{4....}}}}=?$$

$$1-1+1-1+1.....=?$$

$$\sum_{x=1}^{\infty}\frac{1}{x}=?$$

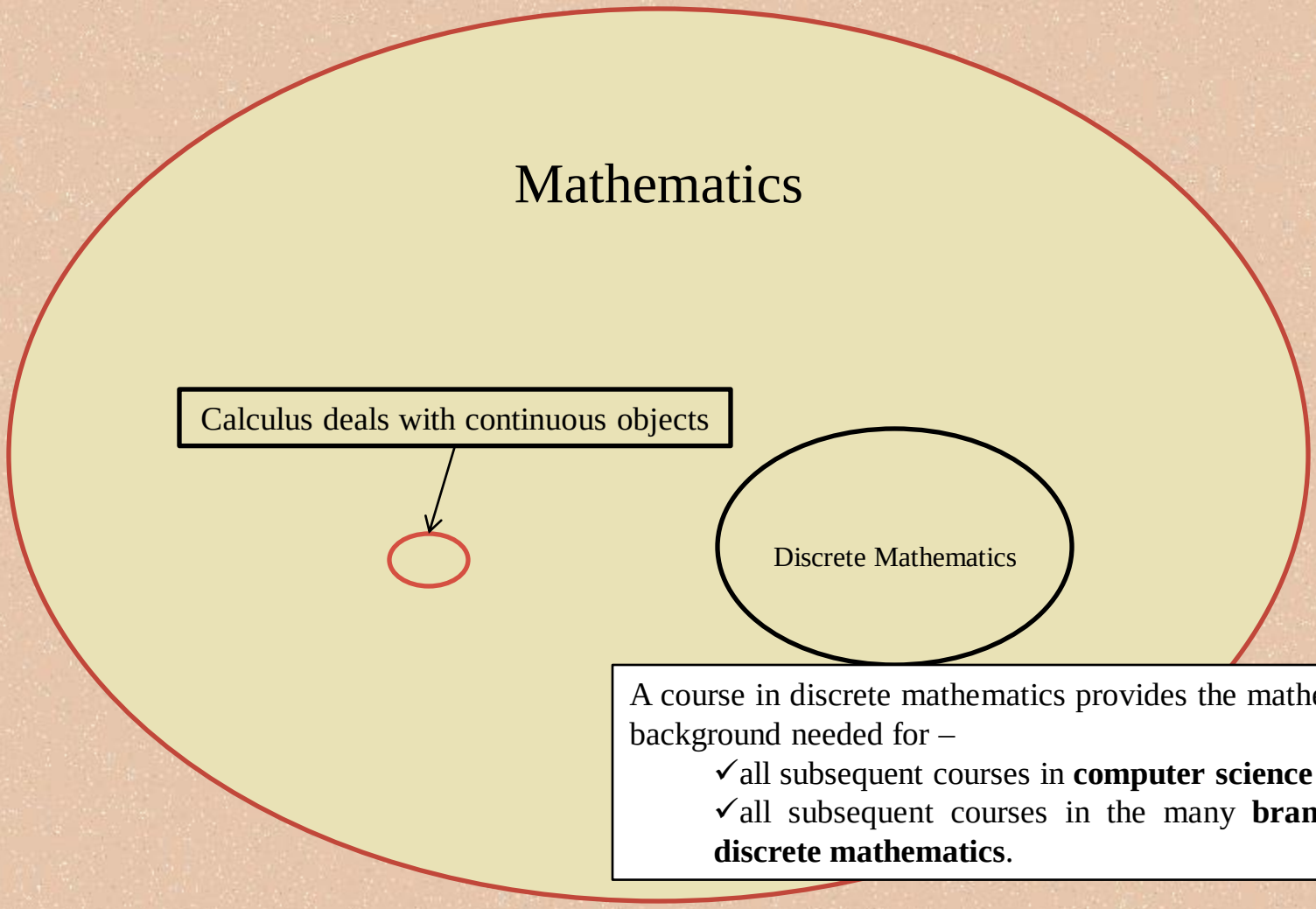
What is Discrete Mathematics?



Examples of discrete objects:

- integers,
- steps taken by a computer program,
- distinct paths to travel from point A to point B on a map along a road network,
- ways to pick a winning set of numbers in a lottery.

What is Discrete Mathematics?



A course in discrete mathematics provides the mathematical background needed for –

- ✓all subsequent courses in **computer science** and
- ✓all subsequent courses in the many **branches** of **discrete mathematics**.

Kinds of Problems Solved Using Discrete Mathematics

- How many ways can a password be chosen following specific rules?
- How many valid Internet addresses are there?
- What is the probability of winning a particular lottery?
- Is there a link between two computers in a network?
- How can I identify spam email messages?
- How can I encrypt a message so that no unintended recipient can read it?
- How can we build a circuit that adds two integers?

Kinds of Problems Solved Using Discrete Mathematics

- What is the shortest path between two cities using a transportation system?
- Find the shortest tour that visits each of a group of cities only once and then ends in the starting city.
- How can we represent English sentences so that a computer can reason with them?
- How can we prove that there are infinitely many prime numbers?
- How can a list of integers be sorted so that the integers are in increasing order?

Goals

- **Mathematical Reasoning**: Ability to read, understand, and construct mathematical arguments and proofs.
- **Combinatorial Analysis**: Techniques for counting objects of different kinds.
- **Discrete Structures**: Abstract mathematical structures that represent objects and the relationships between them. Examples are **sets, permutations, relations, graphs, trees, and finite state machines**.

Goals

- **Algorithmic Thinking**:
  - specifying algorithms,
  - analyzing the memory and time required by an execution of the algorithm, and
  - verifying that the algorithm will produce the correct answer.
- **Applications and Modeling**:
  - understand the wide range of applications of the topics in discrete mathematics
  - develop the ability to develop new models in various domains.
  - have been applied to solve problems in many areas such as **chemistry**, **biology**, **linguistics**, **geography**, **business**, etc.

Discrete Mathematics is a Gateway Course

- Topics in discrete mathematics will be important in many courses that you will take in the future:
  - **Computer Science**: Computer Architecture, Data Structures, Algorithms, Programming Languages, Compilers, Computer Security, Databases, Artificial Intelligence, Networking, Graphics, Game Design, Theory of Computation, ……
  - **Mathematics**: Logic, Set Theory, Probability, Number Theory, Abstract Algebra, Combinatorics, Graph Theory, Game Theory, Network Optimization, …
    - The concepts learned will also be helpful in continuous areas of mathematics.
  - **Other Disciplines**: You may find concepts learned here useful in courses in philosophy, economics, linguistics, and other departments.

Query???

$$\sqrt{1+\sqrt{2+\sqrt{3+\sqrt{4....}}}}$$

$$\exists_{x\in\Re}\exists_{y\in\Re}(x=y)=?$$

$$\sum_{x=1}^{\infty}x=?$$

$$\sum_{x=1}^{\infty}\frac{1}{x}=?$$

$$\forall_x(\Re\mid x)=?$$

$$\exists_{x\in\Re}\exists_{y\in\Re}(x=y)=?$$

$$\sqrt{1+\sqrt{2+\sqrt{3+\sqrt{4....}}}}=?$$

$$1-1+1-1+1.....=?$$

$$\sum_{x=1}^{\infty}\frac{1}{x}=?$$