Introduction

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non-discrete objects

the real line, $\mathbb{R}$

the real plane, $\mathbb{R}^2$

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a continuous function

$(x, y) \in \mathbb{R}^2$ such that $y = x^3$

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discrete objects

people, passwords, balls,…

integers, rational numbers

finite sets

functions from $\mathbb{Z} \to \{0,1\}$

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Discrete Structures

- We will be dealing the different kinds of problems such as:
  - How many valid Internet addresses are there?
  - What is the probability of winning a lottery?
  - How can a spam email message be identified?
  - What is the shortest path between two cities?
  - How many steps required to sort a sequence of integers?
  - How can it be proved that a given algorithm correctly generates an output for all legitimate inputs?

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- a gateway to more advanced course such as data structures, algorithms, automata theory, computer security, and operating systems …

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- Applications and Modeling, from computer science and networking to different areas such as chemistry, biology, geography, …