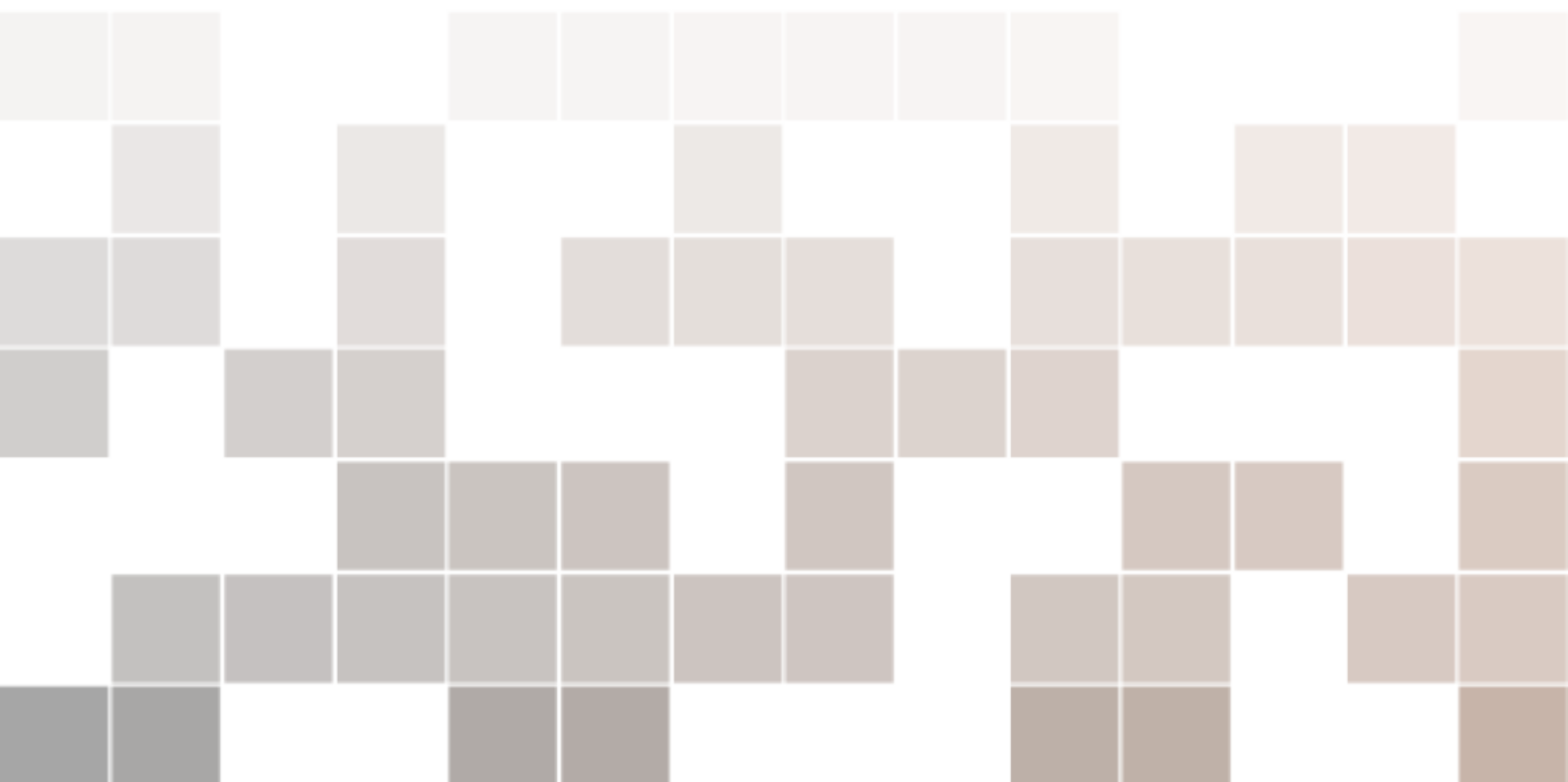


# Lambda Calculus

A Concise but Comprehensive Introduction

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## TEMPLATE-WEBSITE

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# Contents

## I

## Type-free Lambda Calculus

<b>1</b>	<b>Sectioning Examples . . . . .</b>	<b>11</b>
<b>1.1</b>	<b>Introduction . . . . .</b>	<b>11</b>
1.1.1	What is Lambda Calculus? . . . . .	11
1.1.2	Historical Background . . . . .	11
1.1.3	Lambda Calculus and Computation . . . . .	11
<b>1.2</b>	<b>Basics of Type-free Lambda Calculus . . . . .</b>	<b>11</b>

## II

## Typed Lambda Calculus

<b>2</b>	<b>Introduction . . . . .</b>	<b>15</b>
	<b>Bibliography . . . . .</b>	<b>17</b>






## List of Figures







## List of Tables







# Type-free Lambda Calculus

<b>1</b>	<b>Sectioning Examples . . . . .</b>	<b>11</b>
1.1	Introduction . . . . .	11
1.2	Basics of Type-free Lambda Calculus . . . . .	11





# 1. Sectioning Examples

## 1.1 Introduction

This note delves into the theoretical foundation of computer science, focusing on the lambda calculus. Despite its name, lambda calculus is not a calculus in the traditional sense. Instead, it is a formal system to formalize the process of computation. Besides, lambda calculus, though once hated by many mathematicians, has a profound connection to many mathematical notions, binding the study of pure mathematics and theoretical computer science. We will show interesting examples throughout this note to illustrate these connections.

**Definition 1.1 Lambda calculus** is a formal system in mathematical logic for expressing computation based on function abstraction and application using variable binding and substitution. It is a universal model of computation that can be used to simulate any Turing machine.

### 1.1.1 What is Lambda Calculus?

### 1.1.2 Historical Background

### 1.1.3 Lambda Calculus and Computation

## 1.2 Basics of Type-free Lambda Calculus



# II

## Typed Lambda Calculus







## 2. Introduction

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## Bibliography