

# **Theoretical Computerscience – Summary**

Tim Schlachter (7039326)

---

## Contents

<b>1</b>	<b>Words</b>	<b>3</b>
<b>2</b>	<b>Regular Languages</b>	<b>4</b>
<b>3</b>	<b>Regular Expressions</b>	<b>5</b>
<b>4</b>	<b>Common Proof Techniques</b>	<b>6</b>
4.1	Pumping Lemma . . . . .	6
4.1.1	Example . . . . .	6
4.2	Myhill Nerode . . . . .	6
4.2.1	Example . . . . .	6
<b>5</b>	<b>Useful Proofs</b>	<b>7</b>
5.1	Language is Regular . . . . .	7
5.1.1	Finite Set . . . . .	7
5.1.2	Finite Automaton . . . . .	7
5.1.3	Regular Expression . . . . .	7
	<b>Index</b>	<b>8</b>

## 1 Words

A word  $w$  (also called String) has length  $l$  and consists of symbols  $\sigma \in \Sigma$ .

The empty word  $\varepsilon$  has length 0.

## 2 Regular Languages

### 3 Regular Expressions

A regular expression always describes a regular language. If we can build a regular expression  $E$ , then  $L(E) \in \text{REG}$ .

## **4 Common Proof Techniques**

### **4.1 Pumping Lemma**

#### **4.1.1 Example**

### **4.2 Myhill Nerode**

#### **4.2.1 Example**

## **5 Useful Proofs**

### **5.1 Language is Regular**

#### **5.1.1 Finite Set**

#### **5.1.2 Finite Automaton**

#### **5.1.3 Regular Expression**

# Index

Common Proof Techniques, 6

- Myhill Nerode, 6

- Example, 6

- Pumping Lemma, 6

- Example, 6

Regular Expressions, 5

Regular Languages, 4

Useful Proofs, 7

- Language is Regular, 7

- Finite Automaton, 7

- Finite Set, 7

- Regular Expression, 7

Words, 3