

# Chapter summaries in MAT2400 - Real analysis

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## **Chapter 1**

# **Preliminaries: Proofs, Sets, and Functions**

### **1.1 Proofs**

### **1.2 Sets and boolean operations**

### **1.3 Families of sets**

### **1.4 Functions**

### **1.5 Relations and partitions**

### **1.6 Countability**

## **Chapter 2**

# **Metric Spaces**

**2.1 Definitions and examples**

**2.2 Convergence and Continuity**

**2.3 Open and closed sets**

**2.4 Complete spaces**

**2.5 Compact Sets**

**2.6 An alternative description of compactness**

**2.7 The completion of a metric space**

## **Chapter 3**

# **Space of continuous functions**

**3.1 Modes of continuity**

**3.2 Modes of convergence**

**3.3 The spaces  $C(X, Y)$**

**3.4 Application to differential equations**

**3.5 Compact subsets of  $C(X, \mathbb{R}^m)$**

**3.6 Differential equations revisited**

**3.7 Polynomials are dense in  $C([a, b], \mathbb{R})$**

**3.8 Baire's Category Theorem**