

Lecture X: Topic Name

Professor Name

Lecture Date

1 Introduction

Today we will study [topic]. The main goal is to understand [objective].

2 Main Concepts

Definition 2.1. A function $f : X \rightarrow Y$ is called **continuous** if for every open set $V \subseteq Y$, the preimage $f^{-1}(V)$ is open in X .

Theorem 2.2. *Every continuous function from a compact space to a Hausdorff space is closed.*

Proof. Let $f : X \rightarrow Y$ be continuous where X is compact and Y is Hausdorff... \square

Example 2.3. Consider the function $f(x) = x^2$ on \mathbb{R} . This function is continuous because...

Remark 2.4. The converse of the theorem is not always true.

3 Important Results

Lemma 3.1. *If f is continuous and K is compact, then $f(K)$ is compact.*

4 Exercises

1. Prove that composition of continuous functions is continuous.
2. Show that $f(x) = \sin(x)$ is uniformly continuous on \mathbb{R} .