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Math 598, Fall 2018

Problem Set 1

Problems

Problem 1: Review the proof that id_X is continuous. Prove that if $f : X \to Y$ and $g : Y \to Z$ are continuous, then $g \circ f : X \to Z$ is continuous.

Problem 2: Prove that a base for a topology indeed defines a topology.

Problem 3: Prove that the metric topology is a topology.

Problem 4: Show that the notion of a continuous map from $\mathbb{R}^n \to \mathbb{R}$ where $\mathbb{R}^n$ and $\mathbb{R}$ have the metric topology for the Euclidean metric, reduces to the usual ϵ-δ criterion.

Problem 5: Show that any map in Δ can be written in terms of the maps δ and σ.

Problem 6: Give the group structure on the free Abelian group on a set S using $F(S) = Hom(S, \mathbb{Z})$.

Problem 7: Look up or prove that in the simplicial setting $\partial^0 = 0$.