

Topological Spaces and Continuous Functions

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1 Basis for a Topology

2 The Subspace Topology

Problem 2.1. *A map $f : X \rightarrow Y$ is said to be an **open map** if for every open set U of X , the set $f(U)$ is open in Y . Show that $\pi_1 : X \times Y \rightarrow X$ and $\pi_2 : X \times Y \rightarrow Y$ are open maps.*

Solution:



Problem 2.2. *Show that the dictionary order topology on the set $\mathbb{R} \times \mathbb{R}$ is the same as the product topology $\mathbb{R}_d \times \mathbb{R}$, where \mathbb{R}_d denotes \mathbb{R} in the discrete topology. Compare this topology with the standard topology on \mathbb{R}^2 .*