Some Kind of Guide for *Lecture Notes on Elementary Topology and Geometry* by I.M. Singer and John A. Thorpe

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About

> *"Point set topology is a disease from which the human race will soon recover."* - Henri Poincaré (Maybe)

This book has no exercises (so far), but I took notes while (re)proving some of the theorems on my own.

1 Some Point Set Topology

1.1 Naive Set Theory

1.1.1 Theorem 1

We only prove (10) to illustrate the technique; the other parts are either immediate from definitions or can be proved similarly.

(10)

$$
\begin{aligned}
& x \in \left(\cup_{S_i \in \mathcal{S}_1} S_i \right) \cap \left(\cup_{S_i \in \mathcal{S}_2} S_i \right) \\
\implies & \exists i, j \mid x \in S_i \cap S_j \implies x \in \cup_{S_i \in \mathcal{S}_1, S_j \in \mathcal{S}_2} (S_i \cap S_j) \\
& x \in \cup_{S_i \in \mathcal{S}_1, S_j \in \mathcal{S}_2} (S_i \cap S_j) \implies \exists i, j \mid x \in S_i \cap S_j \\
\implies & x \in \left(\cup_{S_i \in \mathcal{S}_1} S_i \right) \cap \left(\cup_{S_i \in \mathcal{S}_2} S_i \right)
\end{aligned}
$$