MA 274: Axioms for a Topology

Let X be a set and let $\mathscr{T} \subset \mathscr{P}(X)$. Then $\mathscr{T}$ is a **topology** on X if the following hold:

(T1) $\varnothing \in \mathscr{T}$

(T2) $X \in \mathscr{T}$

(T3) If $\mathscr{U} \subset \mathscr{T}$ then $\bigcup \mathscr{U} \in \mathscr{T}$

(T4) If $\mathscr{U} \subset \mathscr{T}$ is finite, then $\bigcap \mathscr{U} \in \mathscr{T}$