Let X be a set. A subset $\mathcal{B}$ of $\mathcal{P}(X)$ is called a basis (for a topology on X) if it satisfies the followings:

- $\cup \mathcal{B} = X$.
- $\forall x \in X$, if $x \in B_1 \cap B_2$ for some $B_1, B_2 \in \mathcal{B}$, then $\exists B_3 \in \mathcal{B}$ s.t. $x \in B_3 \subseteq B_1 \cap B_2$.