21. Let X be a topological space and $A, B \subseteq X$ two dense subsets of X. If A is open show that the set $A \cap B$ is dense in X.

22. Let X be a topological space and $D \subseteq X$. Show that D is dense in X if and only if $\overline{D \cap A} = \overline{A}$ for every open $A \subseteq X$.

Hint: Use Exercise 19.

23. Let X be a topological space and $\mathcal{S}$ be a subbase for its topology. Let $D \subseteq X$ such that $D \cap C \neq \emptyset$ for every $C \in \mathcal{S}$. Is D always a dense subset of X?

24. Let X be a topological space and $A \subseteq X$. Show that A is open and closed if and only if $\partial A = \emptyset$.

25. Let X be a topological space, $A \subseteq X$ and $\mathcal{B}(x)$ be a neighborhood base of $x \in X$. Show that

$$\overline{A} = \{x \in X \, : \, B \cap A \neq \emptyset \text{ for every } B \in \mathcal{B}(x)\,\}.$$