1. (Ex. 13 p. 101 textbook) Show that $X$ is Hausdorff if and only if the **diagonal** $\Delta = \{(x, x) \mid x \in X\}$ is closed in $X \times X$.

2. Let $X$ be a topological space and $A$ an arbitrary subset of $X$. Show that

(i) $\text{Cl}(\text{Int}(\text{Cl}(\text{Int}(A)))) = \text{Cl}(\text{Int}(A))$,

(ii) $\text{Int}(\text{Cl}(\text{Int}(\text{Cl}(A)))) = \text{Int}(\text{Cl}(A))$,

where $\text{Cl}(A)$ denotes the closure of $A$ and $\text{Int}(A)$ denotes the interior of $A$.

With this exercise in hand, you could solve Ex. 21, p. 102 of Kuratowski, but this is **not** required for this homework.