For each assume (X, d) is a metric space.

1. In a previous homework we showed that $d(x, y) = 0$ if $x = y$ and $d(x, y) = 1$ otherwise is a metric. Find all open sets of X with this metric.

2. Show that a sequence x_n in X converge to x in X if and only if for all open sets U in X if $x \in U$ then $x_n \in U$ eventually.

3. Show a set $F_A \subseteq A \subseteq X$ is closed subset of A if and only if there exists a closed subset F_X of X such that $F_A = F_X \cap A$.

4. Suppose $A \subseteq B \subseteq X$. Show that if A is open in B which is open in X then A is open in X.