Definition of complement. Given a set A, the complement of A is the set of all element in the universal set X, but not in A. We can write A^c

Definition of closure: if X is a set and *A* is a subset of *X*, then the **closure** of *A* is the intersection of all closed sets in X containing *A*, i.e. the smallest closed set in X containing *A*.

In the context of the task it appears that by closure of the set the universal set is meant.

Let X be a set and A,B are its subsets.

Then $A \cup A^C = X$.

Proof.

$a \in A \cup A^C \ \ iff \ \ a \in A \ or \ a \in A^C \ \ iff \ \ a \in A \ or \ a \notin A \ \ \ iff \ \ a \in X$ □