Home Assignment 4

Discrete Mathematics – CSC/MAT A67, Winter 2024

SETS

1. Let T be a set, let X be a set of subsets of T, and let $Y = \{ S^C \subseteq T : S \in X \}$. Show that the mapping f that maps each $S \in X$ to $S^C \in Y$ is a bijection.

For every $S \in X$, by the definition of Y we have that $S^C \in Y$. Therefore, for every $S \in X$ we have that $f(S) = S^C \in Y$. Thus, f indeed maps every element in X to an element in Y. We claim that:

- f is injective. Let $S \in X$ and $S' \in X$ such that $f(S) = f(S')$. By the definition of f, we have that $S^C = (S')^C$. Assume towards a contradiction that $S \neq S'$.