

## Homework 2

1. Find out if the following equalities hold true for any sets  $A$  and  $B$  in any topological space  $X$ :

$$\text{Cl}(A \cup B) = \text{Cl} A \cup \text{Cl} B$$

$$\text{Cl}(A \cap B) = \text{Cl} A \cap \text{Cl} B$$

2. Give an example in which one of the equalities of Problem 1 is wrong.
3. In the example that you found when solving Problem 2, an inclusion of one side into another one holds true. Does this inclusion hold true for arbitrary  $A$  and  $B$ ?
4. Prove that the intersection of an open everywhere dense set with an arbitrary everywhere dense set is everywhere dense.