

## GENERAL TOPOLOGY HOMEWORK FOR WEEK 4

DEADLINE: MON 24.3, 23:59

**Exercise 1.** *Prove Theorem 3.13 in detail: Let  $A_i, i \in I$  be any collection of connected subsets of  $X$ , and  $\bigcap_{i \in I} A_i \neq \emptyset$ . Then  $\bigcup_{i \in I} A_i$  is connected.*

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Another formulation for  $X$  being a **normal space** is that for every two open sets  $U, V \subset X$  such that  $U \cup V = X$ , there exist closed sets  $A \subset U$  and  $B \subset V$  such that  $A \cup B = X$ .

(This is easy to prove with de Morgan's laws, you don't need to do it here but should check it for yourself.)

**Exercise 2.** *Let  $f : X \rightarrow Y$  be a continuous and closed surjection. Prove that if  $X$  is normal, then  $Y$  is normal.*