

**GENERAL TOPOLOGY
HOMEWORK FOR WEEK 6**

DEADLINE: MON 13.4, 23:59. **NOTE: 2 WEEK DEADLINE**

Exercise 1. *Let X have two topologies \mathcal{T}_1 and \mathcal{T}_2 such that $\mathcal{T}_1 \subset \mathcal{T}_2$. Suppose that \mathcal{T}_1 is Hausdorff and \mathcal{T}_2 is compact. Prove that $\mathcal{T}_1 = \mathcal{T}_2$.*

Exercise 2. *Let X be locally compact and second-countable. Prove that there exists a sequence of open sets U_1, U_2, \dots such that:*

- $\overline{U_j}$ is compact for all j .
- $\overline{U_j} \subset U_{j+1}$ for all j .
- $X = \bigcup_j U_j$.