



TOPOLOGICAL ALGEBRAS–SS 2018

Recap Sheet 5

*This recap sheet aims to self-assess your progress and to recap some of the definitions and concepts introduced in the previous lectures. You do **not** need to hand in solutions, but please try to answer as many questions as you can since this is a very good training in preparation of your final exam. If you should have any problem, please do not hesitate to attend Maria's office hours on Thursdays 2-3 pm in room F408.*

- 1) Give an example of a TVS which is either lb or lc, neither or both.
- 2) Each lb TVS is α -normable for some $0 < \alpha \leq 1$. Can you give an example of an lb TVS which is not 1-normalbe?
- 3) Does each lb TVS also contain a bounded and absolutely α -convex neighbourhood of the origin (for some $0 < \alpha \leq 1$)? Justify your answer!
- 4) Recall the notion of completion for a TVS (see also TVS I-Section 2.5). Does the completion preserve the local boundedness?
- 5) Recall the definition of projective topology and give an example of a TVS that carries such a topology.
- 6) Describe the projective topology in terms of basis of neighbourhoods of the origin.
- 7) Let (E, τ_{proj}) and (F, τ) be two TVS, where τ_{proj} is the projective topology on E w.r.t. the families $\{(E_\alpha, \tau_\alpha) : \alpha \in I\}$ of TVS and $\{f_\alpha : \alpha \in I\}$ of linear maps. Give a sufficient condition for a linear map from F to E to be continuous.
- 8) Carefully recall the definition of projective system and projective limit for $\mathbb{K}$ -algebras and TA. Try to also define those notions for topological spaces, vector spaces and TVS.
- 9) State the universal property of the projective limit of $\mathbb{K}$ -algebras.
- 10) List all the properties that the projective limit of $\mathbb{K}$ -algebras inherits from the underlying projective system.