

## 1. Reminder:

- Definition of compact set
- Equivalent definitions in metric space
- Continuous functions on compact sets
- Elementary properties of compact sets
- Compact sets in  $\mathbb{R}^n$  or  $\mathbb{C}^n$ .

1a. Pointwise convergence of operators on compact set  $\Rightarrow$  uniform convergence

2. Unit ball in  $l^2$  is NOT compact.

3. If the unit ball in  $X$  is compact, then  $\dim X < \infty$ .

4. Example: Hilbert cube.

5. Idea: compact set can be "approximated" by finite dimensional.

6. Remind definition: Schauder basis.

7. Examples of Schauder basis.

8. Compactness criteria in terms of Schauder basis

9. Compactness in  $l^p$ .

10. Arzela-Ascoli thm.

11. Compactness in  $L^1(0,1)$  (with no proof).

12. Idea of weak topology.

13. Reminder: Notion of topological space.  
Base of topology.

14. Definition of weak topology in Banach space.

15. Weak convergence.

16. Norm estimates for weakly convergent sequences.

17. Testing weak convergence on dense set.

18. Weak convergence in  $\ell^p$  and  $C_0$