



Norwegian University of Science
and Technology
Department of Mathematical
Sciences

TMA4230 Functional
Analysis
Spring 2017

Exercise set 2

- 1 Suppose $(x_n)_n$ is a Schauder basis for a Banach space X . Show the following assertions.
 - a) X is separable.
 - b) The set $(x_n)_n$ is linearly independent.
- 2 Let X be a Banach space with a Schauder basis $(x_n)_n$. Define a norm on X by $\|x\|_a = \sup_{N \in \mathbb{N}} \|\sum_{n=1}^N a_n x_n\|$ where (a_n) are the coefficients of x with respect to $(x_n)_n$.
Show that $\|\cdot\|_a$ is a norm on X .
- 3 Show that ℓ^∞ is not separable.