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MAXIMILIANS-
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FUNCTIONAL ANALYSIS TUTORIAL 13

Problem 1. Determine all $p \in [1, \infty]$, for which the sequence $(e_n)_{n \in \mathbb{N}} \subset \ell^p$, given by $e_n = (\delta_{nk})_{k \in \mathbb{N}}$, converges weakly to $0 \in \ell^p$.

[*Hint:* Problem 4 on Exercise Sheet 8 for the case $p = \infty$.]

Problem 2. Let X be a normed space. Prove:

- (i) In X' , weak convergence implies weak-* convergence.
- (ii) If X is reflexive, then weak and weak-* convergence in X' coincide.
- (iii) In general, weak and weak-* convergence are not the same.