FUNCTIONAL ANALYSIS

ICTP - 2020

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Problem Set 4

Problem 31. Read and understand the proofs of Lemma 3.3. (Helly) and Lemma 3.4 (Goldstine) in Brezis' book. Prove the converse of Kakutani's theorem.

Problem 32. Give an example of a linear functional in $(\ell^\infty)^*$ that is not J_f for $f \in \ell^1$. Same problem for $(L^\infty(\mathbb{R}))^*$.

Problem 33. Give an example of a compact metric space X where one has a sequence $\{x_n\}_{n\geq 1}$ that does not admit a convergent subsequence.

Problem 34. Brezis' book - exercise 3.5.

Problem 35. Brezis' book - exercise 3.16.

Problem 36. Brezis' book - exercise 3.17.

Problem 37. Brezis' book - exercise 3.18.

Problem 38. Brezis' book - exercise 3.24.

Problem 39. Prove Theorem 3.29 in the book of Brezis.

Problem 40. Brezis' book - exercise 3.25.

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2000 *Mathematics Subject Classification.* XX-XXX.
Key words and phrases. XXX-XXX.