

Asymptotic Theory of Finite Dimensional Normed Spaces.
Home Works 5, due Wednesday, October 22
Instructor: Prof. Artem Zvavitch

Problem 1. *Please, prove Dvoretzky theorem for the cube (unit ball of ℓ_∞^n) directly using estimates for entropy numbers of S^{n-1} .*

Problem 2. *Please, find (give as good estimate as you can) the dimension of almost Euclidean sections of the unit ball of ℓ_p^n , for $p \in (0, 1)$. (Hint: You should go through the steps of the proof of the theorem and work around convexity assumption. Indeed, the unit ball of ℓ_p^n is NOT convex, but you may use the following simple fact instead of convexity:*

$$\|x + y\|_p^p \leq \|x\|_p^p + \|y\|_p^p, \text{ for all } x, y \in \mathbb{R}^n \text{ and } p \in (0, 1),$$

do not forget to prove this fact.)