36-710
Homework 2

Fall 2019

Due date: Wednesday 09/25 by 5pm in Alden's mailbox.

Problem 1. Prove that

$$\log N(\delta, \mathcal{F}_L, \|\cdot\|_\infty) \lesssim \frac{L}{\delta}.$$

for sufficiently small values of $\delta > 0$. In order to do so, revisit Example 5.10 and show that the functions defined there comprise a suitable covering of $\mathcal{F}_L$.

Problem 2. Exercise 5.10 [W]

Problem 3. Read Example 5.19 in [W]. Then complete Exercise 5.11 [W]. Hint for part (c): Recall the inequality $\langle\langle A, B\rangle\rangle = \mathrm{Tr}(A^\top B) \leq \|A\|_{\mathrm{nuc}}\|B\|_2$ where $\|A\|_{\mathrm{nuc}}$ is the nuclear norm of A and $\|B\|_2$ is the operator norm of B. (Remark: This is so since the operator norm is dual to the nuclear norm, when both are viewed as Schatten norms.)

Problem 4. Exercise 5.12 [W].