

Homework 3 - due Wed. Feb. 19th

High-Dimensional Approximation, Probability, and Statistical Learning

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Homework Policies

As in the first homework set.

Assignment

Study/review the parts discussed in class of Chapter 2,3,4 of R. Vershynin's High-Dimensional Probability lectures notes/book.

Exercises

Exercise 1 (20pts). Study section 2.4 on the degree of random graphs, and do exercise 2.4.2 (Bounding the degrees of sparse graphs). Contrast the result with Proposition 2.4.1.

Exercise 2 (30pts). Prove (in the spirit of ex. 2.5.10 in Vershynin's HDP book) that there exists a constant C such that if X_1, \dots, X_n are n sub-Gaussian random variables (not necessarily independent) with $\|X_i\|_{\psi_2} \leq K$ for all i 's, then

$$\mathbb{E} \max_{i=1, \dots, n} |X_i| \leq CK \sqrt{\log n}.$$

Exercise 3 (30pts). Exercises 3.3.3 and 3.3.5

Exercise 4 (20pts). Exercises 3.4.3.