

Discrete Mathematics exam questions

At the exam everybody will get a larger question, that is, one has to tell everything from a certain part, and a smaller question and an exercise problem. The smaller question roughly means a theorem whose proof is between half and one page. Below I give the list of possible smaller questions. The numbering of the theorem is in agreement of the last version of the lecture note. Naturally, at the exam I will not say that "please, prove Theorem 1.3.7", instead I give a rough description of the theorem. It is also not a requirement to know the names. So feel free to ask me clarifying which theorem I would like to hear.

- Properties of the largest eigenvalue. Possible smaller questions: Prop. 1.1.3; Prop. 1.1.5; Prop. 1.1.6; Prop. 1.1.7; Prop. 1.1.8
- Expanders and pseudorandom graphs. Possible smaller questions: Th. 1.2.1 and Lemma 1.2.2; Th. 1.2.5; Th. 1.2.7; Th. 1.2.9
- Strongly regular graphs. Possible smaller questions: Th. 1.3.4; Th. 1.3.7
- Laplacian eigenvalues and counting spanning trees. Possible smaller questions: Th. 1.5.2 and Th. 1.5.3; Cor. 1.5.6
- Two forms of the combinatorial Nullstellensatz. Possible smaller questions: Th. 2.1.1; Th. 2.1.2; Lemma 2.1.3
- Applications of the combinatorial Nullstellensatz I. Possible smaller questions: Th. 2.2.2; Th. 2.2.5; Th. 2.2.6; Th. 2.2.7; Th. 2.2.8
- Applications of the combinatorial Nullstellensatz II. Possible smaller questions: Th. 2.2.9; Th. 2.3.1; Th. 2.3.4. and 2.3.5
- Probabilistic methods: existence theorems. Possible smaller questions: Th. 3.3.1; Th. 3.3.3;
- Probabilistic methods: first moment method. Possible smaller questions: Th. 3.4.1; Th. 3.4.2; Th. 3.4.4; Th. 3.4.5; Th. 3.4.8
- Altered first moment method (Th. 3.5.6). Possible smaller questions: Th. 3.5.1; Th. 3.5.3; Th. 3.5.5
- Second moment method. Possible smaller questions: Th. 3.6.4; one of the halves of Th. 3.6.8; one of the halves of Th. 3.6.9.

- Snake oil method. Possible smaller questions: Prop. 4.3.1, Prop. 4.3.2; Prop. 4.3.3
- Stirling numbers. Possible smaller questions: Th 4.2.1; Prop. 4.2.3; Prop. 4.2.4; Prop. 4.2.5; Prop. 4.2.6; Prop 4.2.7; Prop 4.2.8; Prop 4.2.9
- Extremal graph theory. Possible smaller questions: Th. 5.2.1; Th. 5.2.2; Lemma 5.4.4