

Good luck! You can get your examination back August 19 at 9 o'clock in the cafeteria. After that they are to be found in Reine Elfsö's room.

- 1a) In how many ways can you place 12 numbered balls in 3 numbered boxes? (One or two boxes may be empty.) 1p
 b) In how many ways can you place 12 identical balls in 3 numbered boxes? (One or two boxes may be empty.) 1p
 c) How many partitions of 12 in at most 3 parts are there? 1p
 d) Same question as in a), but no box may be empty? 1p
 e) Same question as in b), but no box may be empty? 1p
 f) How many partitions of 12 in exactly 3 parts are there? 1p
 g) How many partitions of 12 in parts ≤ 3 are there? 1p
 h) How many partitions of 12 in even parts are there? 1p
 i) How many partitions of 12 in odd parts are there? 1p
- 2a) How many words of length 8 can be made by the letters in RATATATA? 2p
 b) How many words of length 7 can be made by the letters in RATATATA? 2p
- 3) Determine the number of strings $a_1 a_2 \dots a_n$ of length n , where $a_i \in \{0, 1, 2\}$, and which contain an odd number of even numbers. 4p
4. Let G be a graph with 10 vertices marked with the 2-subsets of $\{1, 2, 3, 4, 5\}$. There is an edge between any two vertices which do not have a common number in the marking.
- a) Does G have a Hamilton path? 1p
 b) Does G have an Euler circuit? 1p
 c) Is G bipartite? 1p
 d) Same question as in a) for the complementary graph \bar{G} . 1p
 e) Same question as in b) for the complementary graph \bar{G} . 1p
 f) Same question as in c) for the complementary graph \bar{G} . 1p
- 5a) Determine a minimal spanning tree for the graph below. 1p
 b) Determine the shortest path from a to j in the graph. 2p
 c) Now consider the graph as directed with all arrows directed to the right. Determine a maximal flow and a minimal cut. 3p

