

Good luck! You can get your examinations back December 16 at 10 o'clock in the lecture room. After that you can find them in Reine Elfsö's room.

- 1a) How many partitions of 10 in parts  $\leq 3$  are there? 1p  
 b) How many partitions of 10 in at most 3 parts are there? 1p  
 c) How many partitions of 10 in odd parts are there? 1p  
 d) How many partitions of 10 in even parts are there? 1p
2. How many strings in  $\{0, 1, 2\}$  of length  $n$  containing an odd number of even digits are there? 3p
3. Let  $C$  be a  $4 \times 4$  board with the four squares in the middle removed. (Thus  $C$  consists of 12 squares.) Determine the rook polynomial for  $C$ . 3p
4. Determine the number of ways you can lift  $n$  cards from a deck of cards if you lift 1 or 2 cards each time. 3p
5. A graph  $G$  is called chordal if each cycle  $a_1, a_2, \dots, a_n, n \geq 4, (a_n = a_1)$  in  $G$  has a chord, i.e. there is an edge  $(a_i, a_j)$  of two vertices which are not neighbors in the cycle. (Thus  $G$  has no induced cycle of length at least 4.)
- a) Determine if there exists a chordal graph with 5 vertices that has an Euler circuit but not a Hamilton cycle. 2p  
 b) Determine if there exists a chordal graph with 5 vertices that has a Hamilton cycle but not an Euler circuit. 2p
- 6a) Determine a minimal spanning tree in the graph below. 1p  
 b) Determine a shortest path from  $a$  to  $j$  in the graph. 1p  
 c) Now consider the graph as directed with all arrows to the right. Determine a maximal flow from  $a$  to  $j$  and a minimal cut. 2p

