1. (15p) Explain the problem classes P, NP, and NP complete.

2. (15p) State the SAT problem, and the 3-SAT problem. Using the fact that SAT problem is NP-complete, show that 3-SAT problem is NP-complete.

3. (15p) Explain what is the flow network, and state the Maxflow-Mincut theorem.

4. (15p) Explain what is PTAS (polynomial time approximation scheme), and what is FPTAS(fully PTAS).

5. (15p) Explain any example of dynamic programming.

6. (15p) State a definition of discrete time Markov Chain and its stationary distribution.

7. (15p) State a definition of linear programming (LP).

8. (15p) Explain procedure of the simplex method, or procedure of the ellipsoid method to solve LP. (explain one of them)

Choose any problems you like (at most 7 problems) and answer them. If you get 60 or more points out of the total score of 120, you will pass.

Use separate answer sheets for each problem.

Use English for your answer.