Combinatorial Optimization

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1. Given a convex set $S \subseteq R^n$, convex function, concave function. $f(\lambda \cdot x_1 + (1 - \lambda) \cdot x_2) \leq \lambda \cdot f(x_1) + (1 - \lambda) \cdot f(x_2)$, $x_1, x_2 \in S$ and $0 \leq \lambda \leq 1$. Linear function is both convex and concave. Advantages of concave minimization and convex minimization.

2. Size of a number, vector and matrix.

3. The classes **P** and **NP**.

4. Polytope - A polytope is $conv(X)$ for some set $X \subset \Re^n$.

5. Determinant of a square matrix. Singularity.

6. Matrix-vector multiplication - new form.

7. Rank of a matrix. $r(A) \leq \min(m, n)$.

8. Inverse of a square matrix.

9. System of simultaneous linear equations: $\mathbf{A} \cdot \mathbf{x} = \mathbf{b}$. Meaning.

10. No solutions, unique solution, infinite number of solutions.

11. Gaussian elimination. Elementary row operations. Elementary matrices.

12. Infeasibility in linear systems of equalities (certificates).