

Topics part II, theory:

- 0) Karger's algorithm with analysis
- 1) Computational cost: worst case definition, polynomial vs exponential
- 2) Algorithms from theorems:
 - Prim's algorithm from the Lemma on the minimum weight edge of a cut, **proof included**
 - From Euler theorem to an algorithm for the existence of an Eulerian cycle (theorem without proof)
- 3) Minimum Spanning Tree algorithms (Prim and Kruskal **pseudo-codes**, with proof of exactness)
- 4) Shortest path algorithm: **pseudo-code** (without proof)
- 5) Decision problem version of optimization problems
- 6) Definition of TSP and of the Hamilton cycle problem
- 7) Satisfiability problem: definition of SAT and k-SAT
- 8) Non deterministic algorithms and solution verification
- 9) Complexity classes P and NP
- 10) Notion of polynomial reduction
- 11) Definition of the NP-complete class
- 12) Cook's theorem (without proof)
- 13) Reductions: from 3-SAT to Independent set, and 3-SAT to Vertex Cover
- 14) Introduction to Markov Chains and Simulated Annealing (not for the exam, just for fun)

Exercises:

- small examples of reductions, as done in class