Problems: Intractability

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1. Design a polynomial time algorithm for each of the following problems: 2SAT, Eulerian Cycle, 2-Colorability of Graphs, DNF Satisfiability, and Minimum Edge Cover.

2. Give an example of a problem which is NP-hard but unlikely to be NP-complete.

3. Show that CNF-SAT many-to-one reduces to 3SAT.

4. Show that 3SAT many-to-one reduces to Vertex Cover.

5. Show that 3SAT many-to-one reduces to Exact-3SAT.

6. Show that Directed Hamiltonian Cycle many-to-one reduces to Directed Hamiltonian Path.

7. Show that Vertex Cover many-to-one reduces to Subset Sum.

8. Show that Subset Sum many-to-one reduces to Partition.

9. Show that Vertex Cover many-to-one reduces to Hitting Set.

10. Show that CNF-SAT many-to-one reduces to 3SAT.

11. Show that 3 Dimensional Matching many-to-one reduces to Set Cover.

12. Show that Clique many-to-one reduces to Vertex Cover.

13. Prove that the Traveling Salesman problem is NP-complete.

14. Show that 3SAT many-to-one reduces to 3-Colorability of graphs.

15. Show that Subset Sum many-to-one reduces to Knapsack.

16. Show that Subset Sum many-to-one reduces to Partition.

17. Show that Hamiltonian Cycle many-to-one reduces to Hamiltonian Path.

18. Show that Hamiltonian Path many-to-one reduces to Hamiltonian Cycle.

19. Show that Subgraph Isomorphism is NP-complete.

20. Show that dominating set in NP-complete.

21. Prove the following problems to be NP-complete: Hamiltonian Cycle, 3-Dimensional Matching, 3-Colorability of graphs.