# 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.