Advanced Analysis of Algorithms

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1. Steps to show a problem is **NPC**:

    (a) Show that it is in **NP**. Mostly easy. Sometimes difficult.

    (b) Start with a good, **NP-complete** problem, say $\mathbf{P_1}$,

    (c) Find a suitable, polynomial-time transducer function f.

    (d) Reduce $\mathbf{P_1}$ to our problem, using f.

2. Reductions order problems by difficulty. $B \leq A$ means algorithm for A solves B. Is A really a different way of looking at B?

3. NAE3SAT, Graph 3-coloring.

4. Subset SUM, Partition, Knapsack.

5. Hamilton Path. Hamilton Cycle. Longest Path, Longest Cycle.

6. 3SAT to Hamilton Path.