Design and Analysis of Algorithms: Lecture 1

Ben Chaplin

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1 Overview

1.1 Course details

Course Title: Design and Analysis of Algorithms
Teacher: Professors Erik Demaine, Srini Devadas & Nancy Lynch
School: MIT
Lectures: https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/
Textbook: *Introduction to Algorithms* by Cormen, Leiserson, Rivest & Stein (3rd ed)

1.2 Complexity classes

Definition. P is the class of problems solvable in polynomial time.

Definition. NP is the class of problems verifiable in polynomial time.

Example. Given a graph, does there exist a Hamiltonian cycle? This problem is thought not to be in P, but is in NP. This is because no algorithm has been found to determine whether a graph contains a Hamiltonian cycle in $O(|V|^k)$ time for any $k \in \mathbb{N}$. However, given a graph and a path, it can be verified whether the path is a Hamiltonian cycle in polynomial time.

Definition. NP-complete problems are problems in NP which are "as hard" as any problem in NP.

2 Interval Scheduling

2.1 Problem statement