CSC373 Worksheet 7 Solution

August 14, 2020

1. **<u>Notes</u>**

   - **Decision Problem**

     - Is the problem if determining ansewr to a class of yes/no questions about some objects of interest
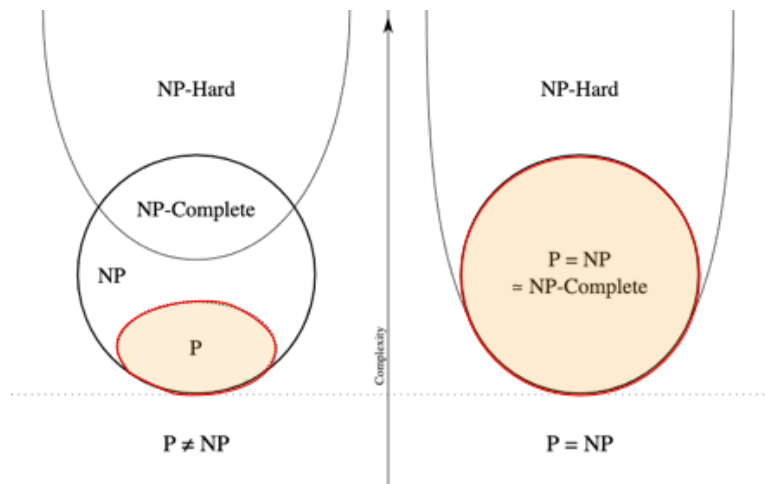
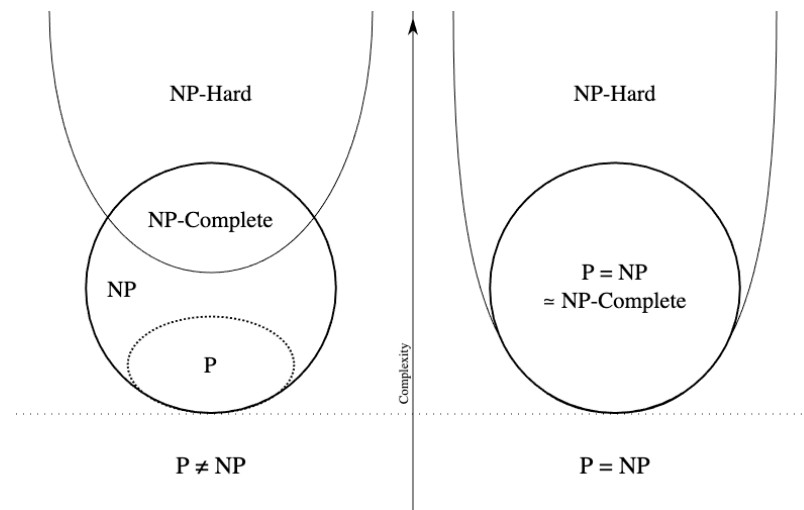   **<u>Example:</u>**

   - **P**

     - Is set of problems that can be solved by a deterministic Turing machine in Polynomial time [2].

   <u>Example:</u>

   1) Shortest path problems
   2) Calculating the greatest common divisor
   3) Finding maximum bipartite matching

- **NP (Non-deterministic Polynominal):**

  - Is set of decision problems that can be solved by a Non-deterministic Turing Machine in Polynomial time.[2]
  - Has no particular rule is followed to make a guess [1].
  - Can be solved in polynominal time via a "lucky algorithm", a magical algorithm that always make a right guess [2]
  - $P \subseteq NP$

- **NP-Hard:**

  Example:

  1) Alan Turing's Halting Problem

References

1) Encyclopedia Britannica, NP-Complete Problem, link
2) Geeks for Geeks, NP-Completeness, link