

Professor Christos – Theory of Computation:

What is a decision problem?

A decision problem refers to a yes or no question that could be answered based on what values are used as the input for the problem

What does it mean for a decision problem to be decidable?

To be decidable, the decision problem must be one for which an algorithm can be constructed to solve the problem (or provide an answer) in this case in a real number of steps

What is the class P? What is the class NP?

These are different kinds of Complexity classes. Class P refers to a problem that can be solved by an algorithm in “Polynomial time”. Polynomial time is a term used to reference “the time required for a computer to solve a problem, where this time is a simple polynomial function of the size of the input” (Oxford Dictionary). Class NP refers to “non-deterministic polynomial time”. These solutions are un-solvable in regular polynomial time, but are “verifiable” in polynomial time.

What is the intuitive meaning of the “P versus NP” question?

This is a question that remains unsolved in computer science. The true meaning relates to the question of “can we equate one to another?”, as NP solutions can be verified in polynomial time - can it be solved in polynomial time too rather than exponential?

If you resolve the P versus NP question, how much richer will you be?

As this remains one of the most famous unanswered questions of the computer science world, many prominent figures have allocated reward amounts for whoever can solve it. For example, The Clay Mathematics Institute will award \$1 Million (Gizmodo. 2019)

Some useful websites with more information on Theory of Computation:

<https://thomasvilhena.com/2019/08/complexity-classes-of-problems>

<https://news.mit.edu/2009/explainer-pnp>

<https://gizmodo.com/if-you-solve-this-math-problem-you-could-steal-all-the-1836047131>