



# WHAT IS COMPUTATION? WHAT IS COMPUTABLE?

ELIF GÜLER

# WHAT IS A COMPUTATION?

Computation is any type of calculation that follows a well-defined model understood and expressed as, for example, an algorithm.

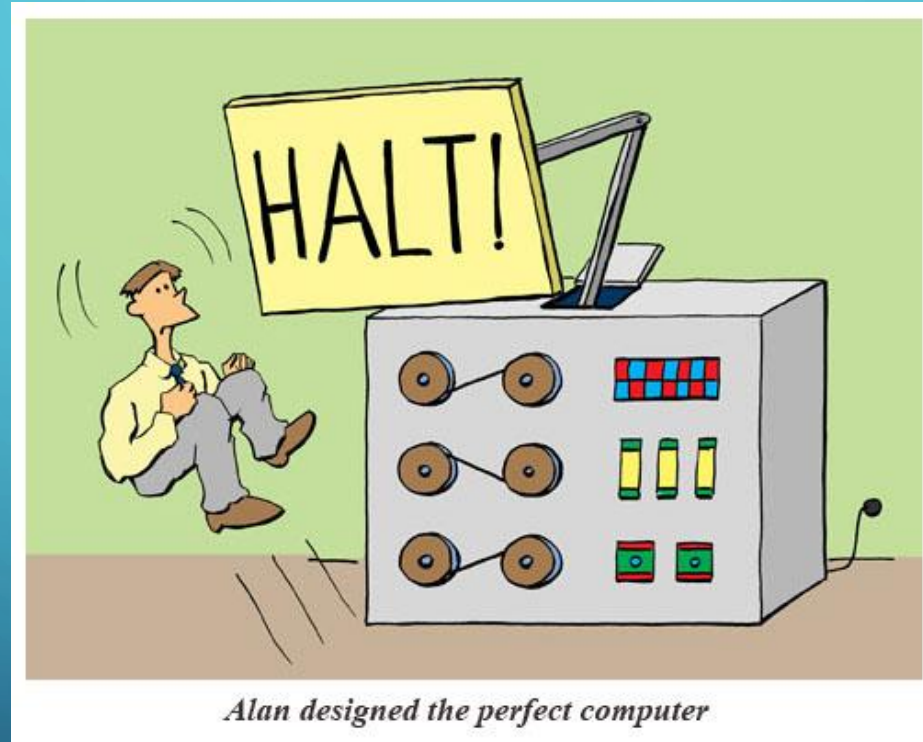
# NP PROBLEMS

Nondeterministic Polynomial problems

- Jigsaw Puzzle:  $O(N!)$  -  $O(N)$
- Nonprime Number: Exponential - Polynomial
- Prime Number??

NP Complete Problems

# HALTING PROBLEM



*Alan designed the perfect computer*

# COMPUTABILITY THEORY

Computability theory, also called recursion theory, is a branch of mathematical logic, of computer science, and of the theory of computation that originated in the 1930s with the study of computable functions and Turing degrees.

- What does it mean for a function on the natural numbers to be computable?
- How can noncomputable functions be classified into a hierarchy based on their level of noncomputability?

# RESOURCES

- <https://en.wikipedia.org/wiki/Computation>
- [https://en.wikipedia.org/wiki/Computability\\_theory#Computable and uncomputable sets](https://en.wikipedia.org/wiki/Computability_theory#Computable_and_uncomputable_sets)
- <http://www.i-programmer.info/babbages-bag/338-computability.html>
- [https://en.wikipedia.org/wiki/Turing\\_degree](https://en.wikipedia.org/wiki/Turing_degree)