the class $P$

$$P = \bigcup_k \text{TIME}(n^k)$$

on a deterministic TM

the class $NP$:
- problems solved in
- polynomial time by
- a non-deterministic TM.

Problems $\Rightarrow$ Languages
Algorithms $\Rightarrow$ Turing deciders
Solutions to problems
- construct a solution
- prove a solution exists
- verify that a candidate solution is correct.
Euler Paths $\in P$

goes through every edge exactly once.

If a graph contains at most 2 odd-degree nodes, then it has an Euler path.

Hamiltonian Path: goes through every node exactly once. $\in NP$
$P \subseteq NP$

$P = NP$?
NP-class of languages w/ P time verifiers

HAMPATH = \{ \langle G, s, t \rangle | G \text{ is a directed graph w/ a Hamiltonian path from nodes } s \text{ to } t \}\}

A verifier for a language A is an algorithm V where

A = \{ w | V accepts \langle w, c \rangle \text{ for some string } c \}.

C: certificate (candidate solution)

HAMPATH Verifier:
V on input \langle \langle G, s, t \rangle, P \rangle

does P represent a Hamiltonian path in G from s to t?