

# NP

## Part a: EXP, P, and NP

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## Example 1: Graph Coloring

Given a graph  $G$  and integer  $k$ , does  $G$  have a proper coloring with  $k$  colors?





## Theorem

$$P \subseteq NP \subseteq EXP$$

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## Example 2: Vertex Cover

Given a graph  $G$  and integer  $k$ , does  $G$  have a vertex cover of size  $k$ ?

# More Problems in NP

## Example 3: Independent Set

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## Example 4: Circuit SAT

Given a Boolean circuit, is there an assignment to the inputs that makes the output true/1?

# Recap: Learning Objectives

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