Lecture 3.1

Vertex-Cover problem

Determine the smallest possible set of vertices, such that all edges in the graph are adjacent to at least one of the vertices in the set.

More formally: select minimum-size subset $C \subseteq V$ such that for each edge $(u, v) \in E$ we have $u \in C$ and/or $v \in C$.

The subset C is also known as the **cover**.

Trivial algorithm for Vertex-Cover

While there are uncovered edges, add an endpoint of an uncovered edge to the cover.
This algorithm can be implemented with running time $O(|V| + |E|)$.
The trivial algorithm may compute a cover of size $(|V| - 1) \cdot OPT(G)$ _(when it makes bad choices in a star graph, i.e. a graph with a single central node, where other nodes are only connected to this central node)._