# Computer Science 3711
# (Winter 2003):
# Handout:
# Computational Problems

## Vertex Cover (VC)

*Input:* An undirected graph $G = (V, E)$ and an integer $k > 0$.

*Question:* Is there a vertex cover of $G$ of size at most $k$, *i.e*, is there a subset $V' \subseteq V$ such that $|V'| \leq k$ and for all edges $(u, v) \in E$, at least one of $u$ and $v$ is in $V'$?

## Vertex Cover Cost (VC-C)

*Input:* An undirected graph $G = (V, E)$.

*Output:* The size of the smallest vertex cover of $G$.

## Vertex Cover Example (VC-E)

*Input:* An undirected graph $G = (V, E)$.

*Output:* One of the smallest vertex covers of $G$.

CLIQUE
*Input*: An undirected graph $G = (V, E)$ and an integer $k > 0$.
*Question*: Is there a clique in $G$ of size at least $k$, *i.e.*, is there a subset $V' \subseteq V$, $|V'| \geq k$, such that for all $u, v \in V'$, $(u, v) \in E$?

SUBSET SUM (SS)
*Input*: A set $S \subset \mathcal{N}$ of integers and an integer $k \geq 0$.
*Question*: Is there a subset $S'$ of $S$ whose elements sum to $k$?

STEINER TREE IN GRAPHS (STG)
*Input*: An undirected graph $G = (V, E)$, a set $V' \subseteq V$, and an integer $k > 0$.
QUESTION: Is there a tree in $G$ that connects all vertices in $V'$ and contains at most $k$ edges?