

A clique in an undirected graph  $G = (V, E)$  is a subset  $C \subseteq V$  of vertices such that  $E$  contains every possible edge between vertices in  $C$ , i.e. for all  $u \neq v \in C$ ,  $\{u, v\} \in E$ . The language **CLIQUE** is defined as:

$$\mathbf{CLIQUE} = \{\langle G, k \rangle \mid G \text{ has a clique of size at least } k\}$$

For every  $k \in \mathbb{N}$ , the language  $k$ -**CLIQUE** is defined as:

$$k\text{-CLIQUE} = \{\langle G \rangle \mid G \text{ has a clique of size at least } k\}$$

Show that for every  $k \in \mathbb{N}$ ,  $k$ -**CLIQUE**  $\in \mathbf{P}$ . Why doesn't this imply that **CLIQUE**  $\in \mathbf{P}$ ?