Exercise 1. Show that Path Packing has no polynomial kernel unless NP \subseteq \text{coNP/poly}.

Path Packing
Input: A graph $G$ and an integer $k$
Parameter: $k$
Question: Are there $k$ pairwise vertex-disjoint paths of length at least $k$ each?

Exercise 2. An endpoint of a path is a vertex that has degree at most 1 in the path. Consider the NP-complete Anchored Path problem.

Anchored Path
Input: A graph $G = (V, E)$, a vertex $r \in V$, and an integer $k \leq |V|$
Parameter: $k$
Question: Does $G$ have a path on $k$ vertices as a subgraph such that $r$ is an endpoint of that path?

Prove that Anchored Path has no polynomial kernel unless coNP \subseteq NP/poly.