1. Give a counterexample to the conjecture that if there is a path from $u$ to $v$ in a directed graph $G$, and if $\text{vn}(u) < \text{vn}(v)$ in a depth-first search of $G$, then $v$ is a descendant of $u$ in the depth-first forest produced.

2. A directed graph $G = (V, E)$ is said to be weakly connected if, for all pairs of vertices $u, v \in V$, we have a path from $u$ to $v$ or a path from $v$ to $u$. Give an efficient algorithm to determine whether $G$ is weakly connected. (Hints: (1) for simplicity, you may assume $G$ to be acyclic; (2) use topological sort.)