Exercise 23.2-4

Main Idea:

Short version:

In a BFS, the final value \( d[u] \) of node \( u \) is the length of the shortest path from the root \( d[u] = \delta(s, u) \). Therefore, it is independent of the order with which the adjacency lists have the nodes. (Theorem 23.4).

Long version:

Induction on the depth \( d[u] \).

Hypothesis: For the nodes of depth \( d[u] = k \), the depth does not depend on the adjacency list order.

1. Basis: for depth = 0, root.
2. Hyp.: for depth = k.