1. [MR 4.9]. Consider the following randomized variant of the bit fixing algorithm. Each packet randomly orders the bit positions in the label of its source and then corrects the mismatched bits in that order. Show that there is a permutation for which, with high probability, this algorithm uses $2^{\Omega(n)}$ steps to route. **Hint**: Do something similar to the permutation given in class as a lower bound for non-randomized bit fixing, but with a different number $k \neq n/4$ bits set to one on each half.

2. [MR 7.2]. Two rooted trees $T_1$ and $T_2$ are said to be isomorphic if there exists a one to one mapping $f$ from the nodes of $T_1$ to those of $T_2$ satisfying the following condition: $v$ is a child of $w$ in $T_1$ if and only if $f(v)$ is a child of $f(w)$ in $T_2$. Observe that no ordering is assumed on the children of any vertex. Devise an efficient randomized algorithm for testing the isomorphism of rooted trees and analyze its performance. **Hint**: Recursively associate a polynomial $P_v$ with each vertex $v$ in a tree $T$. The book has a more detailed hint.