Let $G = (V, E)$ be a given graph where $|V| = N$ and $|E| = M$. Suppose we wish to color each node of G either black or white such that no two adjacent nodes share the same color. Assume without loss of generality that the initial node visited in the graph is to be colored black. Design an $O(N + M)$ time algorithm to provide such a coloring or determine that none exists.

Below are simple examples of a graph that is 2-colorable (on the left) and another that is not (on the right).