Theory of Computation

Homework 1
Due: 2009/10/06

Problem 1. Given a directed graph $G(V, E)$, a function $f : V \to \{1, 2, 3\}$ and $a, b \in V$, let the COLORED REACHABILITY problem ask whether G contains a path P from a to b such that each edge (u, v) on P satisfies $f(u) \neq f(v)$. Briefly argue whether COLORED REACHABILITY $\in$ P. You may want to use the fact that REACHABILITY can be solved in polynomial time by breadth-first or depth-first search.

Problem 2. Let $\mathbb{N}$ be the set of natural numbers. Does there exist a bijection between $2^{\mathbb{N}}$ and NP?