Tutorial 6

Q1. Graph 2-colorability problem is defined as follows:

Input: a (undirected) graph (V, E).

Question: Is there a coloring of vertices of the graph using two colors (that is mapping f: from V to $\{0, 1\}$) such that for any $(u, v) \in E$, u,v are colored differently? (that is $f(u) \neq f(v)$).

Show that graph 2-colorability problem is in **P**.

Q2. Show that the following problem (called Knapsack) is NP-complete.

Input: a set $S = \{s_1, s_2, \ldots, s_n\}$ of objects and their weights, $w_1, \ldots, w_n$, and their values $v_1, \ldots, v_n$, along with a Knapsack size K and a value V.

Question: Is it possible to select some subset S' of S such that total weight of the objects in S' is $\leq K$ but the total value of objects in S' is $\geq V$?