Homework 13

1. The *Set Partition Problem* takes as input a set S of numbers. The question is whether the numbers can be partitioned into two sets A and $\overline{A} = S - A$ such that

$$\sum_{x \in A} x = \sum_{x \in \overline{A}} x.$$

   Show that *SET-PARTITION* is NP-Complete. (Hint: Reduce *SUBSET-SUM*.)

2. Let

   $DOUBLE\text{-}SAT = \{ \langle \phi \rangle \mid \phi$ is a Boolean formula with two satisfying assignments $\}$.

   Show that *DOUBLE-SAT* is NP-Complete. (Hint: Reduce *3SAT*.)

3. Let G represent an undirected graph. Also let

   $SPATH = \{ \langle G, a, b, k \rangle \mid G$ contains a simple path of length at most k from a to $b \}$

   and

   $LPATH = \{ \langle G, a, b, k \rangle \mid G$ contains a simple path of length at least k from a to $b \}$.

   (a) Show that $SPATH \in$ P.

   (b) Show that *LPATH* is NP-Complete. You may assume the NP-completeness of *UHAMPATH*, the Hamiltonian path problem for undirected graphs.