ET6501701
Homework #4

Date: May 8, 2024.
Due Date: May 29, 2024. **Instructor: M. B. Lin**

Please note that **NO late homework** will be accepted.

1. By using the reduction technique, explain how would you solve each of the following questions:

   (a) Finding the median: Given a set of numbers, find the median value.

   (b) Distinct values: Determine the number of distinct values in a set of numbers.

2. Show that the $\leq_P$ relation is a transitive relation on languages. That is, show that if $L_1 \leq_P L_2$ and $L_2 \leq_P L_3$ then $L_1 \leq_P L_3$.

3. 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 $\bar{A} = S - A$ such that $\sum_{x \in A} x = \sum_{x \in \bar{A}} x$. Show that the set -partition problem is NP-complete.

4. The 3-color problem is that we are given an undirected graph $G = (V, E)$, determine whether G can be colored with three colors or not. Show that the 3-color problem is NP-complete.