1. Provide a polynomial-time algorithm that will reduce the given problems A to the given problems B, and state the cost of the reduction algorithm in terms of N.

   a) Problem A: Computing the median value in a list of N integers; Problem B: Sorting a list of N integers.

   b) Problem A: Detecting a cycle in a directed graph of N vertices; Problem B: Depth-first search.

   c) Problem A: All-pairs shortest paths; Problem B: Single-source shortest paths

   d) Problem A: Element distinctness (determining if all elements in an array of size N are different); Problem B: Sorting a list of N integers.

*Question 2 on reverse side →*
2. The goal of the bin packing problem is to put \( n \) items whose sizes are positive real numbers not larger than 1 into the fewest number of bins of size 1. State the decision version of the bin packing problem, and outline a polynomial-time algorithm that verifies whether or not a proposed solution solves the problem. You may assume that the proposed solution represents a legitimate input to your verification algorithm.