# Question 1

* Since the function is constant time, namely , then it is in complexity class .
* As Definition 2 in Lecture 9(c) says, the notion of -hard for a complexity class has “built into” it, or makes sense only in the context of, a notion of a reduction, .
* In the context of the class , the notion of a reduction that is assumed when someone says -hard, is Definition 1, Lecture 9(c), which is represented as “.”

# Question 2

* Solve this problem by showing: (i) every problem reduces to this problem, and (ii) this problem is itself .
* Carry out something similar to what the proof for Claim 1 Lecture 10(a) does, except that that claim is for **NP** and not **P**.
  + Let be any problem in **P**. We need to show that reduces to our problem.
  + Now we want to leverage what we know about . Specifically, what we know is that there is a polynomial-time algorithm, call it , that given any instance of , correctly outputs true or false.
  + Now we want to think about how we can leverage to reduce to our problem.

# Question 3

# Question 4

Example of a valid automorphic mapping:

A picture containing text, clock

Description automatically generated

* So long as at least one vertex is mapped to a different vertex than itself, it is a valid automorphism, because the mapping is no longer the identity.
* is an edge in the one graph if and only if is an edge in the other.

# Question 5