EE360C: Algorithms
The University of Texas at Austin
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Quiz #1
January 25, 2017 (*in class*)

Name: **EID:**

Quiz #1

Complete this problem individually. Use only this paper for your answer. **Clearly note somewhere on the front if you use the back of this sheet for your answer.**

Problem 1: Functions

Prove or disprove the following claim: "Given two functions $f(x)$ and $g(x)$, if $h(x) = f(g(x))$ is one-to-one (injective) then $g(x)$ is also one-to-one."

Recall that one-to-one functions are defined as functions such that: every element of the function's codomain (output values) maps to at-most one value in the domain (input values).

Solution

The claim is true.

Proof by contradiction: Suppose there exists some a and b inputs for $g(x)$ such that $g(a) = g(b)$. This would mean our final $h(x)$ computation would reduce to $h(a) = h(b) = f(g(a)) = f(g(b))$ implying that $h(x)$ is also not one-to-one. This is a contradiction and thus $g(x)$ must be one-to-one as well.