Honor Code

The Honor Code for CS204 Students

Students enrolled at the KAIST CS204 course are expected to respect personal honor and the rights of others, and they must possess personal integrity and honesty. The students will neither give nor receive any unauthorized aid in class work that is to be graded by the instructor. The following acts are regarded as violations of academic integrity and honesty.

- Referring from other students'/publisher's solutions, assignments, and reports.
- Allowing another student to refer from one's own work
- Submitting another student's work as his or her own
- Unpermitted collaboration or aid on take-home examinations and class assignments
- Plagiarism: the use of another person's original work without giving reasonable and appropriate credit to or acknowledging the author or source

The professor will determine whether any violation has occurred and the appropriate penalty for the violation.

"I have read and agree to abide by all of the above rules and policies, and pledge that I will neither give nor receive any unauthorized aid on examinations or other class assignments that are used by the instructor as the basis for grading."

Student's Name: ________________________________ (Signature)

Date : ________________________________

(This Honor Code format was originally generated for CS320 instructed by Prof. Sukyoung Ryu.)

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CS204
Fall 2017, Assignment #0

Problem 1. *2 + 2 pts*

Suppose both $f : A \to B$ and $g : B \to C$ are functions and let $g \circ f$ be one-to-one and onto.

a) Should f be one-to-one or/and onto?
b) Should g be one-to-one or/and onto?

Justify your answer and prove why.

Problem 2. *1 + 2 + 3 pts*

Show that the polynomial function $f : \mathbb{Z}^+ \times \mathbb{Z}^+ \to \mathbb{Z}^+$ with $f(m,n) = \frac{(m+n-2)(m+n-1)}{2} + m$ is

a) well defined,
b) one-to-one,
c) onto.

Like this problem, one can compare cardinality of infinite sets by constructing a well-defined one-to-one/onto function from one set to another.

Problem 3. *5 pts*

Instead of writing all elements of the power set of $\{a, b, c, d\}$ sequentially, draw a directed acyclic graph of that power set. You should make a directed edge $A \to B$ if $A \supsetneq B$ and $\nexists C$ s.t. $A \supsetneq C \supsetneq B$.

Problem 4. *1 + 2 + 2 + 3 + 2 pts*

Let $f : S \to T$ be a function, $A, B \subseteq S$, and $X, Y \subseteq T$. Define the *image* $f[A] := \{f(x) | x \in A\}$ and the *preimage* $f^{-1}[Y] := \{x | f(x) \in Y\}$.
Justify your answer for below items and prove why / disprove by counterexample.

a) $f[A \cup B] = f[A] \cup f[B]$?
b) $f[A \cap B] = f[A] \cap f[B]$?
c) $f^{-1}[X \cup Y] = f^{-1}[X] \cup f^{-1}[Y]$?
d) $f^{-1}[X \cap Y] = f^{-1}[X] \cap f^{-1}[Y]$?

If f is also one-to-one, what changes?