

Final Exam

Your Name and Student Number: _____

Your class number: ☐ ITP20002-01 (1PM) ☐ ITP20002-02 (4PM)

- Total **11 pages** including this cover material, the problem sheet, the answer sheets and blank pages. You must turn in all pages.
- Write your name on every page (at the top)
- You have **8 problems** with **120 minutes** (100 points).
- Write answers **only in given boxes**. No points for the words outside the boxes.
- Write answers **clearly**. No points for illegible writings.
- Write answers in **English**. Korean is allowed only for commenting on your English writings.
- Read the following quoted from Handong CSEE Standard and write your signature below.

Examination

1. Examination is an educational act necessary for evaluation of the students' achievement and for encouraging the students to absorb the material in the process of preparation.
2. Student should do their best to prepare for exams in order to improve her/his own knowledge and skill and should fully engage in the test during examination hour.
3. Accessing or providing unauthorized information, including other students' answer sheets, is regarded as cheating. The use of electronic devices, including cell phones and computers, without permission is strictly prohibited.
4. Entering or leaving the classroom during the examination before the finish time without permission is regarded as cheating.

I agree to uphold Handong Honor Code and Handong CSEE Standard in taking this exam.

Signature: _____

- Your name: _____

Problems

Write an answer to each problem on the corresponding box in your answer sheets.

1. Use mathematical induction to prove $\sum_{j=2}^n C(j, 2) = C(n+1, 3)$ for all integers $n > 1$ (14 points)
2. Give a recursive definition of the transitive closure of a relation R (9 points)
3. How many relations on a set having n elements exist when the relation has each of the following properties (12 points):
 - (a) anti-symmetric
 - (b) asymmetric
 - (c) neither reflexive nor irreflexive
4. Prove the generalized Bayes' theorem (16 points)
5. What is a recursive definition of a function, and how it is used? (15 points)
6. Suppose that graphs G_1 and H_1 are **isomorphic** and G_2 and H_2 are **isomorphic**. Prove or disprove $G_1 \cup G_2$ and $H_1 \cup H_2$ are isomorphic. (14 points)
7. Let E be an event that a randomly generated bit string of length 5 contains an odd number of 1 and let F be the event that the string starts and ends with 1. Are E and F independent? (10 points)
8. Define the set of all **one-to-one functions** from a set X to a set Y using the set-builder notation (10 points)

● Your name: _____

Problem 1

Problem 2

● Your name: _____

Problem 3

(a)

(b)

(c)

Problem 4

● Your name: _____

Problem 5

Problem 6

● Your name: _____

Problem 7

Problem 8

end.

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