BINUS UNIVERSITY INTERNATIONAL
OFF-CAMPUS EXAM

DAY – DATE: Tuesday , 10 November 2020 at 13.00 – 16.00 pm, Western Indonesia Time (Jakarta,GMT+07:00)	
SEMESTER:	ODD Semester 2020/2021
EXAM TYPE:	Off Campus Examination (MID)
PROGRAM:	Computer Science
CODE - COURSE NAME:	COMP6570 - Discrete Structures
LECTURER:	D3776 - Fergyanto E. Gunawan, Dr. Eng D5403 - Dr. Sani Muhamad Isa, S.Si., M.Kom.
CLASS:	L1AC/L1BC
TIME ALLOWED:	Tuesday , 10 November 2020 at 13.00 – 16.00 pm (180 minutes), Western Indonesia Time (Jakarta,GMT+07:00)

OFF-CAMPUS EXAM REGULATIONS:

1. Write your answers in **correct** and **proper English** only.
2. Students are responsible for preparing all their needs for the exam, for example: Internet connection, laptop, etc.
3. You MUST STAND BY 5 minutes before the exam starts by signing in the system.
4. Students must submit and upload their answers through the system within the exam time.
5. A student may complete and submit the answers of the exam into the portal before – but not after – the exam time ends.
6. No additional exam time will be given for tardy students.
7. A student will be considered cheating if he or she is suspected of doing plagiarism ***as already defined in the student guidelines. Plagiarism is committed through, but not limited to, the following acts:***
    - ***Copying the work of another student***
    - ***Directly copying any part of another person's work***
    - ***Summarizing the work of another person***
    - ***Using or developing an idea or thesis derived from another person's work***
    - ***Using experimental results obtained by another person***
    - ***Incitement by a student of another to plagiarize***
    - ***Copy pasting from a book / textbook.***
8. Any student who is caught doing the above action (s), will be listed by name and the Ethics Committee will decide whether or not the action is considered as cheating.
9. Should the Ethics Committee consider and verify your actions as cheating, **you will immediately face expulsion** from BINUS UNIVERSITY INTERNATIONAL/~~BINUS BUSINESS SCHOOL - MASTER PROGRAM~~ *).
10. If a student finds difficulty to upload the answers, they have to contact the staff within the exam time with evidence to further process.

*) Choose one

1. [10%] Express these system specifications using the propositions p "The user enters a valid password," q "Access is granted," and r "The user has paid the subscription fee" and logical connectives (including negations).
   a) "The user has paid the subscription fee, but does not enter a valid password."
   b) "Access is granted whenever the user has paid the subscription fee and enters a valid password."
   c) "Access is denied if the user has not paid the subscription fee."
   d) "If the user has not entered a valid password but has paid the subscription fee, then access is granted."

2. [10%] Give an example of a function from $\mathbf{N}$ to $\mathbf{N}$ that is
   a) one-to-one but not onto.
   b) onto but not one-to-one.
   c) both onto and one-to-one (but different from the identity function).
   d) neither one-to-one nor onto

3. [10%] Prove that $3n < n!$ if n is an integer greater than 6

4. [10%] Seven women and nine men are on the faculty in the mathematics department at a school.
   a) How many ways are there to select a committee of five members of the department if at least one woman must be on the committee?
   b) How many ways are there to select a committee of five members of the department if at least one woman and at least one man must be on the committee?

5. [10%] What is the conditional probability that exactly four heads appear when a fair coin is flipped five times, given that the first flip came up tails?

6. [10%] Let A, B, and C are three matrices defined on the following.

$$A = \begin{bmatrix} 1 & 3 & 8 \\ 2 & 4 & 11 \\ 1 & 2 & 5 \end{bmatrix}, B = \begin{bmatrix} 7 & -5 & 1 \\ 1 & -4 & 3 \\ 2 & 0 & 1 \end{bmatrix}, C = \begin{bmatrix} 1 & 2 & 1 \\ -2 & 1 & 2 \\ 4 & 3 & 2 \end{bmatrix}$$

   Compute:
   a) $-2A$
   b) $B - 2A$
   c) CA

7. [10%] Compute A^{-1} of the matrix A in Problem 6 by elementary row operations.

8. [10%] Compute the determinant of the matrix A in Problem 9.

9. [10%] Compute the vector x for the equation $Ax = b$ where the matrix A and the vector b are given on the following. **Use elementary row operations**.

$$A = \begin{bmatrix} 4 & -3 & 1 \\ 5 & -2 & 5 \\ -6 & 2 & -3 \end{bmatrix}, b = \begin{bmatrix} -7 \\ -3 \\ 10 \end{bmatrix}$$

10. [10%] Compute the vector x in in Problem 9 by using the **Cramer's rule**.