

University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination, Spring - 2021

Program: B. Sc Engineering (4th Year, 1st Semester)

Course Title: Mathematics for Computer Science

Course No.: CSE 401

Credit: 3.0

Time: 1.00 Hours.

Full Mark: 60

There are **Four** Questions. **Answer three questions including 1 and 2.** All questions are of equal value/Figures in the right margin indicate marks.

1. (a) Determine the maximum value of the function $f(x, y, z) = x + y + 2z$, using Lagrange Multipliers method, where there is a constraint to satisfy, and the constraint is defined as $x^2 + y^2 + z^2 = A$. [15]
Where, A is one greater than the last digit of your ID.
For example, if your ID is 113007 then, $A = 7+1 = 8$.

- (b) State the general equation of Naïve Bayes with notation indication. [5]

2. (a) Consider the following Ackermann function: [15]

$$A(m, n) = \begin{cases} n + 1, & \text{where } m = 0 \\ A(m - 1, 1), & \text{where } n = 0 \\ A(m - 1, A(m, n - 1)), & \text{otherwise} \end{cases}$$

Determine the value of $A(1, x)$. Where, $x = \text{your ID mod } 2 + 2$.

- (b) Determine the expected value of getting head from first coin toss. [5]

3. (a) Suppose there is a dataset as follows— [15]

$X1 = [4, a, 3, 5]$

$X2 = [2, 1, b, 3]$

Where, $a = \text{Your ID mod } 3 + 1$.

$b = \text{Your ID mod } 5 + 1$.

Determine the Eigen values of the dataset.

- (b) Analyze a real-life example where we can apply constrained optimization problem. [5]

Or,

4. (a) Determine the expected value of getting TTHT in a fair coin toss. [15]

- (b) Differentiate between probabilities and expected values. [5]

