THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

JANUARY – APRIL 2019 TRIMESTER

FACULTY OF COMMERCE

DEPARTMENT OF ACCOUNTING AND FINANCE

REGULAR PROGRAMME

CID 072: FOUNDATIONS OF BUSINESS MATHEMATICS

Date: APRIL 2019	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions	

Q1. a) Some forty (40) people were asked about their preferences as far as the daily papers are A, B and D. It was noted that those who buy Newspaper A do not buy Newspaper D and vice versa. Six (6) of them were found to buy newspaper D only, seven (7) bought Newspaper A and B. Five (5) bought newspaper B only, while ten (10) bought Newspaper A only. Four (4) of them do not buy any single paper. Determine the number of persons who buy at least newspaper B. Identify the most popular Newspaper.

b) Two fair dices are tossed once. Let S be the sum of numbers showing up A and B be the following events.

A: sum is at most 5

B: at least one of the dices shows a "2"

Determine:

i) P(A)
ii) P(B)
iii) $P(A \cap B)$
iv) $P(A \cup B)$
v) $P(A^c \setminus B^c)$
vi) $P[(A \cap B)^c \cup (A \setminus B)]$

Q2. a) Solve the following simultaneous equations:

$x – y + z = 2$
$x + 2y – 2z = -1$
$-x + 2y + 2z = 9$ **(5 marks)**

b) $3y + y - z = 2$
$X + 2y - z = 2$
$5x + 3y + z = 14$ **(5 marks)**

c) $38 + 2p = 6q$
$5p + 8q = 89$ **(5 marks)**

d) $5x - 2y = 7$
$3x + 8q = 21$ **(5 marks)**

Q3. a) Solve the following LP problem graphically

Minimize $2x_1 + 1.7x_2$

Subject to: $0.15x_1 + 0.10x_2 \geq 1.0$

$0.75x_1 + 1.70x_2 \geq 7.5$

$1.30x_1 + 1.10x_2 \geq 10.0$

$x1, x2 \geq 0$

b) Solve the following problem graphically

Maximize $4x_1 + 4x_2$

Subject to: $-2x_1 + x_2 \leq 1$

$x_1 \leq 2$

$x_1 + x_2 \leq 3$

$x_1, x_2 \geq 0$ **(20 marks)**

Q4. a) Use Pascal's triangle to expand the following binomial expression:

i) $(1 + 3x)^2$ **(5 marks)**

ii) $(a - b)^7$ **(5 marks)**

iii) $(1 - 5x)^5$ **(5 marks)**

b) Find the coefficient of x^5 in the expansion of $(1 + 4x)^9$ **(5 marks)**

THE LIST OF FORMULAE

A. Covariance ($cov_{(xy)}$ or S_{xy}) = $\frac{1}{N}\sum(x_i - \ddot{X})(y_i - \dot{Y})$

B. $cov_{(xy)}$ or S_{xy} = $(\frac{1}{N}\sum x_i y_i) - \ddot{X}\dot{Y}$

C. Coefficient of Correlation (r_{xy}) = $\frac{Sxy}{SxSy}$

D. $$r = \frac{n\sum xy - \left(\sum x\right)\left(\sum y\right)}{\sqrt{n\left(\sum x^2\right) - \left(\sum x\right)^2}\sqrt{n\left(\sum y^2\right) - \left(\sum y\right)^2}}$$

E. Rank correlation coefficient or spearman's rank correlation coefficient (r_s)

F. $$\rho = 1 - \frac{6\sum d_i^2}{n(n^2 - 1)}$$

G. Method of least squares
H. $\sum y = na + b\sum x_i$
I. $\sum y_i x_i = a\sum x_i + b\sum x_i^2$
J.
K. $\sum x_i = na + b\sum y_i$
L. $\sum x_i y_i = a\sum y_i + b\sum y_i^2$
M.
N. Kendall Rank correlation

$$\tau = \frac{n_c - n_d}{\frac{1}{2}n(n-1)}$$

O.
P. Pearson r correlation

$$r = \frac{N\sum xy - \sum (x)(y)}{\sqrt{[N\sum x^2 - \sum (x^2)][N\sum y^2 - \sum (y^2)]}}$$

Q.

$$b = \frac{n\left(\sum XY\right) - \left(\sum X\right)\left(\sum Y\right)}{n\left(\sum X^2\right) - \left(\sum X\right)^2}$$

$$a = \frac{\left(\sum Y\right) - b\left(\sum X\right)}{n}$$

R. $LSMA = a + bX$

S. $b = r_{xy} - \frac{Sy}{Sx}$

T. $a = \dot{Y} - b\ddot{X}$

U.

V. $\hat{b} = \frac{\sum xiyi - n\ddot{X}\dot{Y}}{\sum x^2 - n\ddot{X}^2}$

W.

X. $b_{xy} = r\frac{\delta x}{\delta y}$

Y.

Z. $b_{xy} = r\frac{\sum xy}{\sum y2}$

AA.

BB. $b_{xy} = \frac{N\sum dxdy - \sum dx\sum dy}{N\sum dy2 - (\sum dy)^2}$

CC.

DD. $b_{xy} = \frac{N\sum dxdy - \sum dx\sum dy}{N\sum dx2 - (\sum dx)^2}$

EE.

FF. $r = \sqrt{(b_{xy} x b_{yx})}$

GG. $$P(n,r) = {}^{n}P_{r} = {}_{n}P_{r} = \frac{n!}{(n-r)!}$$

HH. $$C(n,r) = {}^{n}C_{r} = {}_{n}C_{r} = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

II. $$P(A \mid B) = \frac{P(A \cap B)}{P(B)}.$$

JJ. $$P(A \mid B) = \frac{P(A) \cdot P(B)}{P(B)} = P(A)$$

KK. $$P(B \mid A) = P(A \mid B) \cdot \frac{P(B)}{P(A)}.$$

LL. P(A) = 1 - P(A')

MM. P(A ∩ B) = P(A) P(B|A)

NN. P(A ∪ B) = P(A) + P(B) - P(A ∩ B))

OO. P(A ∪ B) = P(A) + P(B) - P(A)P(B | A)

END