AFRICA NAZARENE UNIVERSITY

CENTRE:	**RONGAI**
DEPARTMENT:	**COMPUTER SCIENCE**
UNIT TITLE:	**BASIC MATHEMATICS**
UNIT CODE:	**MTH 100**
LECTURER:	**I. MUKIRI**
TRIMESTER:	**2ND TRIMESTER 2014/2015**
DATE:	**9TH APRIL, 2015**
TIME:	**9.00AM – 11.00AM**

Instructions:

1. Answer question **One (Compulsory)** and **ANY** other **TWO** questions.

2. Clearly show your working

3. Write all your answers in the answer booklet provided.

4. Time allowed: Two hours.

Question One: (Compulsory – 36 marks)

a) Solve for x in;

  (i) $2(6 + 2x) = -2(2x - 5)$ (2 marks)

  (ii) $|x - 4| = 3$ (2 marks)

b) The sum of two numbers is 97 and their difference is 7. Find the two numbers.

  (4 marks)

c) Solve for x in; $4x^2 + 7x + 3 = 0$ (4 marks)

d) Given the sequence; $9, -6, 4, \ldots..$ determine;

  (i) The 7th term (2 marks)

  (ii) The sum of the 10 terms of the sequence. (2 marks)

e) An integer x is picked at random from the set; $1 \leq x \leq 20$. Find;

  (i) The probability of picking a prime number. (2 marks)

  (ii) The probability of picking a multiple of 5 or a factor of 24 (3 marks)

f) Given the roots $x = -2$ and $x = -\frac{3}{5}$, determine a corresponding equation of the form $ax^2 + bx + c = 0$ (2 marks)

g) Given the sets $A = \{(x, y): 0 \leq x \leq 3, y \geq 0\}$, $B = \{(x, y): y \leq 2x + 1\}$ and $C = \{(x, y): y \leq 4 - x\}$. Illustrate on the same set of axes set $A \cap B \cap C$ (6 marks)

h) Consider the following data that represent the marks scored by 50 students in a test;

Marks	20 -29	30 – 39	40 – 49	50 – 59	60 – 69	70 -79	80 – 89
No. of students	2	3	9	14	17	4	1

  (i) List **two** reasons why the mean is an important measure in statistics. (2 marks)

  (ii) Calculate the standard deviation of the sample (5 marks)

Question Two: (12 marks)

a) Solve for x in; $5(x - 4) = 2(x + 1) - 7$ (2 marks)

b) A soda retailer noted that twice the number of crates, of two brands Fanta and Pepsi exceeded three times their difference by 8, while half the sum was one more than their difference. If the number of Fanta crates was x and the number of pepsi crates was y, find x and y. (4 marks)

c) Solve the following system;

$$x - y + 2z = 0$$
$$-x + 2y - 3z = 1$$
$$2x - 2y + z = -3$$

(6 marks)

Question Three: (12 marks)

a) Apply Cramer's rule to solve; $\begin{matrix} 5x - 7y = 31 \\ x + 2y = -4 \end{matrix}$

(4 marks)

b) Solve for x in; $\dfrac{2x+3}{4x-1} = \dfrac{3x-2}{3x+2}$

(4 marks)

c)

   (i) Plot the graph of $y = 1 - 2x - 3x^2$ between $x = -3$ and $x = 3$

(3 marks)

   (ii) and hence use it to solve the equation $1 - 2x - 3x^2 = 0$

(1 mark)

Question Four: (12 marks)

a) A bag X contains 4 white marbles and 5 black marbles. A similar bag Y contains 6 white marbles and 5 black marbles. A bag is randomly selected and two marbles randomly picked one at a time with replacement. Find the probability of picking a white and a black marble.

(4 marks)

b) Study the diagram below and attempt the questions that follow;

3
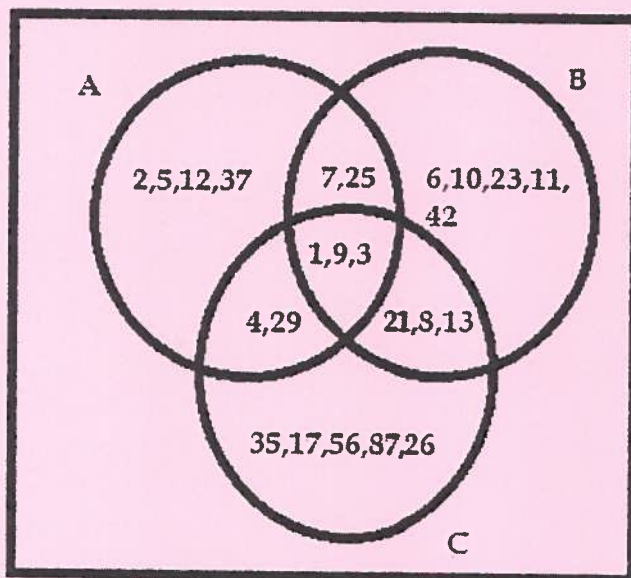
List the members of set;

(i) $A \cap B$ **(1 mark)**

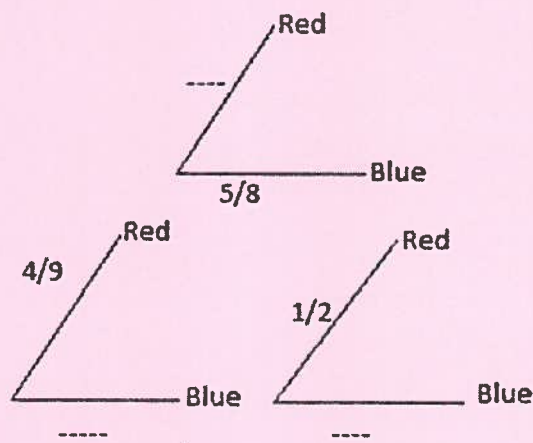(ii) $(A \cup C) \cap B^c$ **(2 marks)**

(iii) $(A \cap B)^c$ **(2 marks)**

Determine;

(i) $n(A \cup B)$ **(1 mark)**

(ii) $n(A \cap B \cap C)^c$ **(1 mark)**

(iii) $n(A \cup B \cup C)^C$ **(1 mark)**

Question Five: (12 marks)

a) The 2nd term of an A.P. is 11 and the 11th term -7. Find;

(i)   The 1st term of the A.P.   **(2 marks)**

(ii)   The common difference d **(2 marks)**

(iii)   The sum of the first 40 terms.   **(2 marks)**

b) Fill in the tree diagram below and use it to find the probability of getting at least one red
                                                        (6 marks)

"No matter what may be happening today, God has good things in store for your future! It may not be easy to see now, but God has already lined up a new beginning, new friendships and new opportunities for you."
Joel Osteen