



INFORMATION AND COMMUNICATION UNIVERSITY

ICE0112: HIGHER MATHEMATICS 1: ASSIGNMENT 1

Lecturer's Name: Henry Sinkala

Instructions:

Answer ALL Questions

- 1- Use the Assignment cover page provided below
- 2- You are expected to type your assignment (or handwritten and save as **ONE** pdf file)
- 3- Answer all questions and Label all your Solutions according to the Question Number
- 4- Use Times New Roman font type, font size 12 and 1.5-line spacing. (if typed)
- 5 – Deadline: The Assignment is due on **14th MAY, 2024**
- 6- Assignment should be uploaded on the Portal by due date.**

N.B: Save the Assignment as: surname_firstname _ student #_ module name_Assignment #

E.g: Bwalys John_202112345_Higher Mathematics1_Assignment 1

Notice:

i. Assignment Total Marks: 15 marks

ii. DL students are required to write a TEST (25 marks) during residential classes.

iii. Full-Time students will be writing weekly tests/quizzes total (25 marks)

STUDENTS' COVER PAGE

INFORMATION AND COMMUNICATION UNIVERSITY

School:.....

Degree Programme:.....

Course name and Code.....

Assignment No.(1)

Student's Surname:

Student's First name:

Student number:

Mode of Study:(*FT/DL*)..(*your mode of study*)

E-mail Address:*your email*

Phone Number:*your number*

Lecturer's name:

Due Date: *14th MAY, 2024*

ANSWER ALL QUESTIONS:

QUESTION 1

Consider the subsets $A = [-2, 4]$, $B = (-1, 5)$ and $C = (-3, 7]$ of the universal set $(-4, 8]$. Find each of the following sets and display them on the number line.

i) $(A \cap B)$ ii) C' iii) $B' \cap A$ iv) $(A \cap C)'$ **[10 Marks]**

b) The quadratic equation $2x^2 + 4x + 5 = 0$ has roots α and β . Find the value of:

i) $(\alpha - \beta)^2$ **[5 Marks]**

ii) $\frac{1}{\alpha} + \frac{1}{\beta}$ **[5 Marks]**

c) By using the remainder theorem. Find the remainder R when the polynomial

$P(x) = 6x^3 + 7x^2 - 15x + 4$ is divided by $x - 1$ **[5 Marks]**

QUESTION 2

a) Given that θ is acute and that $\cos \theta = 1/\sqrt{3}$, Find values of $\sin \theta$, $\cot \theta$, $\tan \theta$, $\operatorname{cosec} \theta$, $\sec \theta$, leave your answers in surd form. **[6 Marks]**

b) i) Given that $f(x) = 2x + 3$, Confirm that $f^{-1}(f(x)) = x$ **[4 Marks]**

ii) Find the value of x and y when $2 - j3 = \sqrt{(x + jy)}$ **[5 Marks]**

c) Graph the following quadratic equation $y = -x^2 + 4x - 3$ showing all your working **[10 Marks]**

QUESTION 3

a) Convert $2 \angle 60^\circ$ into $a + jb$ form, correct to 4 significant figures. **[5 Marks]**

b) Determine, in polar form: $2 \angle 60^\circ \times 4 \angle 30^\circ$ **[5 Marks]**

c) Let $Z_1 = 1 + j2$ and $Z_2 = 4 - j3$. Determine (i) Z_1/Z_2 ,
in the form $a + jb$ where a and b are real numbers

$$(ii) \quad Z_1^2 - \left(\frac{1}{Z_2^2} \right)$$

[7 Marks]

c) Using the synthetic division find the quotient and the remainder when

$6x^3 + 7x^2 - 15x + 4$ is divided by $x - 1$ **[8 Marks]**

QUESTION 4

a) Rationalize the denominator of i) $\frac{2\sqrt{2} + \sqrt{3}}{2\sqrt{2} - \sqrt{3}}$ [4 Marks]

b) Given that $p = 2i + j - 3k$, $q = -i + j + 4k$ and $r = 6j - 5k$, evaluate and simplify the following vectors in i, j, k form:

i) $-q + 2p$ ii) $q - 2p$ iii) $7r - 2q$ [9 Marks]

c) Prove the following identities

i) $\operatorname{Cosec} x - \sin x = \cos x \cot x$ [6 Marks]

ii) $\cos^2 \theta + 3 \sin^2 \theta = 3 - 2 \cos^2 \theta$ [6 Marks]

Prepared by: Sinkala
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Use of ChatGPT will attract a penalty of ZERO (0) Mark.