CHUKA  **UNIVERSITY**

EXAMINATION FOR THE AWARD OF
BACHELOR OF

MATH 114/124: GEOMETRY AND LINEAR ALGEBRA

STREAMS: **TIME: 2 HOURS**

DAY/DATE: THURSDAY 13/09/2018 **8.30 AM – 10.30 AM**

INSTRUCTIONS:

QUESTION ONE (30 MARKS)

(a) Determine the centre and the radius of the circle whose equation is $x^2+y^2-4x-2y-15=0$. (4 marks)

(b) Find the equation of a circle whose centre is at the point $(2,3)$ and which passes through the point $(2,2)$ in the form $ax^2+by^2+cx+dy+f=0$ (5 marks)

(c) A line L_1 passes through $(1,2)$ and has a gradient of 5. Another line L_2 is perpendicular to L_1 and meets it at the point where $x=4$ .Find the equation of L_2 . (5 marks)

(d) A plane has the equation $2x+3y+6z+28=0$. Calculate the shortest distance of the point $(-1,1,1)$ from the plane. (3 marks)

(e) Find the equation of the hyperbola in standard form if its centre is the origin and the points $(6,-1)\wedge(8,\sqrt{8})$ lie on it. (4 marks)

(f) Solve the quadratic equation $x^2-\frac{2}{5}x+\frac{1}{5}=0$ (4 marks)

(g) Find the eccentricity of $\frac{y^2}{25}-\frac{x^2}{4}=1$ (5 marks)

QUESTION TWO (20 MARKS)

(a). Analyze fully and graph the equation
$x^2+4y^2+4x-8y+7=0$ (12marks)

(b) If **AB=a** and **AC=b**, show that the area of the triangle ABC is given by Area= $\frac{ab}{\sqrt{a.b}}$

(4 Marks)

(c) Hence or otherwise find the area of the triangle whose vertices are A(1,-5,3) , B(-1,1,6) and C(3,0,1). (4 Marks)

QUESTION THREE (20 MARKS)

(a) Use matrix inverse method to solve
$2x+y-4z=3$

$x+2y-z=7$

$z-y+3x=4$ (11 Marks)

(b). Convert $4xy=c^2$ into polar coordinates. (3 marks)

(c) Given that $Z_1=5i+9$ and $Z_2=2i-3$ find

(i) Z_1Z_2 (2 marks)

(ii) $a and b given \frac{Z_2}{Z_1} = ax + bi$ (4 marks)
