CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN BRIDGING

MATH 0012: BASIC CALCULUS

STREAMS: CERT. BRIDGING **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY06/12/2017 **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER THREE

QUESTION ONE (30 MARKS)

(a) Find the equation of a line parallel to the line $y = 3x + 2$ and passing thorugh the point (1,1). [3 marks]

(b) Given the function defined by$f(x) = 25 - x^2$ and $g(x) = \sqrt{x}$

Evaluate $(gof)(3)$ [4 marks]

(c) Evaluate $\lim_{x \to 2} \frac{x^2-4}{x-2}$ [2 marks]

(d) Given $f(x) = 2x - 1$ and $g(x) = 3x + 2$. Find [3 marks]

(i) $(f + g)(x)$

(ii) $f(2)$

(iii) $g(-1)$

(e) Using the first principle of differentiation, find the derivative of the function.[5 marks]

$y = 2x^2 - 4x + 3$

(f) Solve the following simultaneous equation graphically [4 marks]

$2x - y = 8$

$9x + 3y = 21$

(g) Find $\frac{dy}{dx}$ using method of choice or the indicated technique in the bracket.

(i) $y = \frac{x^2+4x}{2x-1} (Quotient\ rule)$ [3 marks]

(ii) $y = (2x - 1)^7 (chain\ rule)$ [2 marks]

(h) The gradient of a function $y = f(x)$ is given by $\frac{dy}{dx} = \frac{-1}{2}x + x^2$. If $y = 8$and $x = 2$.

Find y in terms of x [4 marks]

QUESTION TWO (10 MARKS)

(a) After t seconds a particle has travelled a distance of 5 metres where;

$S = -27t + 15t^2 - t^3$

(i) At what time does the velocity become zero. [3 marks]

(ii) At what time does the acceleration vanished. [2 marks]

(iii) Calculate the velocity and acceleration at $t = 2$ [2 marks]

(b) Evaluate $\int (x - x^2)dx$ [3 marks]

QUESTION THREE (10 MARKS)

(a) Evaluate $\int_{-1}^{3} \left(x^2 - 2x^3\right) dx$ [4 marks]

(b) Evaluate $\lim_{y \to 2} \frac{y^2 - 5y + 6}{y^2 - 4}$ [3 marks]

(c) Find the area under a curve from $x = 0$ to $x = 1$ given by $y = x^2 - x$ [3 marks]

QUESTION FOUR (10 MARKS)

(a) Approximate the value $\int_{1}^{4} \left(x^2 + 6x + 1\right) dx$ using trapezoidal rule with 8 strips.[6 marks]

(b) Find the gradient and y − intercept of the following line $2y - 3x = 5$ [4 marks]

QUESTION FIVE (10 MARKS)

(a) Given the function defined by $f(x) = x^3$ and $g(x) = x - 3$

Find

(i) $fog\ (x)$ [2 marks]

(ii) fof [2 marks]

(iii) $go3f$ [3 marks]

(b) Using the above functions $f(x)$and $g\ (x)$. Find

$\frac{f(x)}{g(x)}$ [3 marks]

QUESTION SIX (10 MARKS)

(a) Find the equation of the tangent and normal to the graph of $y = x^2 + 5x + 2$ at $x = 1$ [5 marks]

(b) Evaluate $\int_1^4 \frac{1}{x} dx$ using Simpson's rule using 8 intervals. [5 marks]
