

**KARATINA UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**2013/2014 ACADEMIC YEAR**

**FIRST** YEAR **SUPPLEMENTARY/SPECIAL EXAMINATION**

**FOR THE DEGREE OF**

**BACHELOR OF SCIENCE (AST,ACS, SC); BACHELOR OF EDUCATION (EDS,ED); BACHELOR OF COMPUTER SCIENCE (COM) AND BACHELOR OF INFORMATION TECHNOLOGY (BIT)**

**COURSE CODE: MAT 110**

**COURSE TITLE: BASIC CALCULUS**

**DATE:**  **TIME:**

**INSTRUCTION TO CANDIDATES**

* SEE INSIDE

**SECTION A (31 marks)**

**INSTRUCTIONS: *Attempt* ALL *Questions in Section A.***

**QUESTION ONE (16 marks)**

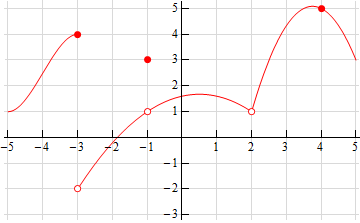
1. Form the composition  given that  and .

(3 marks)

1. Sketch the graph: . (2 marks)
2. Below is the graph of  For each of the given points, determine the value

of  and . If any of the quantities do not exist, clearly explain why.

1. . (1 mark)
2. . (1 mark)
3.  (1 mark)
4. . (1 mark)



1. Find . (3 marks)
2. Evaluate the limit of each of the following:
3. . (2 marks)
4. . (2 marks)

**QUESTION TWO (15 marks)**

1. Find using the first principles the derivative of of .

(3 marks)

1. Differentiate the following equation with respect to : .

(4 marks)

1. For what values of *x* is the function  continuous? (2 marks)
2. Use the formal definition of limits to prove that . (3 marks)
3. If , find . (3 marks)

**SECTION B (39 marks)**

*Attempt* ***ANY THREE*** *Questions From This Section.*

**QUESTION THREE (13 marks)**

1. Differentiate . (4 marks)
2. An object moves along a co-ordinate line, its position at each time 

given by . Find the position, velocity, acceleration, and

speed at time . (5 marks)

1. Find the second derivative of the function: . (4 marks)

**QUESTION FOUR (13 marks).**

1. Find  given . (5 marks)
2. Find  given . (4 marks)
3. Find  given . (4 marks)

**QUESTION FIVE (13 marks).**

1. Find  given that . (4 marks)
2. Determine the stationary points of the curve , state

their nature and hence sketch a graph of the curve. (5 marks)

1. Differentiate . (4 marks)

**QUESTION SIX (13 marks).**

1. Evaluate the limit: . (3 marks)
2. Compute the inverse of  given that . (3 marks)
3. An apartment complex has 250 apartments to rent. If they rent *x* apartments

then their monthly profit, in dollars, is given by .

How many apartments should they rent in order to maximize their profit?

(4 marks)

1. Find the domain and the range of the function . (3 marks)

**QUESTION SEVEN (13 marks).**

1. Find the intervals on whichincreases and the intervals

on whichdecreases. (5 marks)

1. Find the value of  prescribed in Rolle’s theorem for  on

the interval . (3marks)

1. Given that  where  are differentiable functions of ,

show that . (3 marks)

1. State the mean value theorem. (2 marks)