



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION: Bachelor of Science ; Bachelor of Science in Applied Mathematics and Statistics	
QUALIFICATION CODE: 07BSOC; 07BAMS	LEVEL: 5
COURSE CODE: CLS502S	COURSE NAME: CALCULUS 1
SESSION: JANUARY 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 75

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	Ms. H. Y. SHAANIKA Mrs. L. KHOA
MODERATOR:	Prof G. HEIMBECK

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL the questions in the booklet provided.2. Show clearly all the steps used in the calculations.3. All written work must be done in blue or black ink and sketches must be done in pencil.

PERMISSIBLE MATERIALS

1. Non-programmable calculator without a cover.

THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)

Question 1 [2]

Consider the relation $R = \{(1,9), (2,7), (1,4)\}$. Is R a function? Justify your answer.

Question 2 [8]

Let $f(x) = \frac{8}{\sqrt{x^2+3x-10}}$. Use a detailed sign- table to find the domain of f .

Question 3 [7]

Find $\lim_{x \rightarrow 3} \frac{\sqrt{x+1}-2}{x-3}$.

Question 4 [4]

Prove that $f(x) = 3x + 5$ is injective.

Question 5 [2;2]

Investigate whether the following functions are odd or even.

(a) $f(x) = x^2$

(b) $f(x) = \sin x$

Question 6 [2;2]

(a) State Rolle's Theorem.

(b) State the mean Value Theorem.

Question 7 [8;3]

(a) Show that $\frac{d}{dx} \tan x = \sec^2 x$ using quotient rule.

(b) Find $\lim_{x \rightarrow -2} \frac{x^3+8}{x+2}$.

Question 8 [9;5]

Let $f(x) = x(x + 1)^3$. Use detailed sign tables in answering the following questions.

- (a) Find the intervals in which f is increasing or decreasing.
- (b) Find the intervals in which the graph of $y = f(x)$ is concave upwards or downwards.

Question 9 [3;2;4]

Consider $f(x, y) = xe^{xy} + \frac{x}{y}$. Find f_x , f_y and f_{xy} .

Question 10 [6]

Let $f(x) = \begin{cases} 3x + 3c & \text{if } x \geq 2 \\ x^2 - cx & \text{if } x < 2 \end{cases}$. If $\lim_{x \rightarrow 2} f(x)$ exists, find the vales of c .

Question 11 [6]

Find the rate of change of the area of a circle per second with respect to its radius r when $r = 5 \text{ cm}$.

TOTAL MARKS: [75]

END OF EXAMINATION