



PAMIBIA 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: 6
COURSE CODE: CLS601S	COURSE NAME: CALCULUS 2
SESSION: JANUARY 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 80

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINERS:	Dr O. Shuungula
MODERATOR:	Dr S.N. Neossi Nguetchue

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 [11 Marks] Evaluate each of the following integrals.

[6;5]

$$(a) \int 2x \ln 3x \, dx$$

$$(b) \int \frac{1}{1+4x^2} \, dx$$

Question 2 [12 Marks]

Let R be the region bounded by the graph of the equation $y = -2x^2 + 2x$ and the x-axis.

(a) Find the volume of the solid generated by revolving R around the x-axis.

[7]

(b) Find the volume of the solid generated by revolving R around the y-axis.

[5]

Question 3 [9 Marks]

Find the arclength of the graph of the following function between $x = 1$ and $x = 4$.

[9]

$$f(x) = 9 + x^{\frac{3}{2}}$$

Question 4 [8 Marks]

Use Simpson's rule with $n = 6$ to estimate the value of the following integral. Round your answer to three decimal places.

[8]

$$\int_1^4 \sqrt{1+x^3} \, dx$$

Question 5 [12 Marks]

(a) Determine whether the following series is convergent or divergent.

[6]

$$\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2+1}$$

(b) Determine whether the following series is absolutely convergent.

[6]

$$\sum_{n=1}^{\infty} (-1)^n \frac{(n^2)(3^n)}{(n+1)!}$$

Question 6 [15 Marks]

Find the radius and the interval of convergence of the following power series. [15]

$$\sum_{n=1}^{\infty} (-1)^n \frac{2^{n+1}(x-1)^n}{n^2}$$

Question 7 [8 Marks]

Find the Taylor series of the following function, centered at 2. [8]

$$f(x) = \frac{1}{x}$$

Question 8 [5 Marks]

For any natural number n let $I_n = \int x^n e^x dx$. Find a recursive formula for I_n . [5]

TOTAL MARKS: [80]

END OF EXAMINATION