



UNIVERSITY OF EDUCATION, WINNEBA
INSTITUTE FOR TEACHER EDUCATION AND
CONTINUING PROFESSIONAL
DEVELOPMENT (ITECPD)



END-OF-FIRST-SEMESTER EXAMINATIONS. AUGUST, 2023
LEVEL 300

COURSE CODE: JBM 352

COURSE TITLE: TEACHING AND ASSESSING CALCULUS

TIME ALLOWED: 2 HRS

STUDENT'S INDEX NUMBER:

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GENERAL INSTRUCTIONS:

- This paper is made up of ONE SECTION.
- The Section is made up of five essay type questions.
- Answer any THREE questions in your answer booklet.
- Each question carries equal marks. You are expected to start each question on a new page.
- You are expected to hand over your answer booklet to the invigilator before you leave the examination hall.

Instruction: Answer any three (3) questions in the answer booklet provided.

1 (a) Find $\lim_{t \rightarrow 0} \frac{\sqrt{t^2 + 9} - 3}{t^2}$.

(b) Alhassan and James argued that $\lim_{x \rightarrow 0} \frac{|x|}{x}$ exist. Prove that $\lim_{x \rightarrow 0} \frac{|x|}{x}$ does not exist.

(c) Using first principle, find the first derivative of $f(x) = \frac{1}{x^2}$.

- 2 (a) Determine the linear approximation for $f(x) = \sqrt[4]{x}$ at $x = 256$. Use the linear approximation to approximate the value of $\sqrt[4]{25608}$, correct to seven decimal places;

Solve; $\int \frac{x+14}{(x+5)(x+2)} dx$

3. (a) Find the volume of the solid obtained by rotating about the x -axis the region under the curve $y = \sqrt{x}$ from 0 to 1. Illustrate the solution by sketching.
(b) Calculate $\lim_{x \rightarrow \infty} \frac{e^x}{x^2}$
4. (a) Sketch the graph of the function $y = 2x^2 + 3x - 2$.
(b) (i) Differentiate $x^2y^2 - xy = 8$
(ii) Evaluate the slope of the curve at the point P(1,2)
- 5 (a) (i) Evaluate; $\lim_{n \rightarrow 1} \frac{x^3 - 2x^2 - 5x + 6}{x^2 + x - 2}$
(ii) If $\lim_{n \rightarrow 0} \frac{\sin x}{x} = 1$, find $\lim_{n \rightarrow 0} \frac{\sin 2x}{3x}$.
(b) Differentiate from first principle:
(i) $y = \frac{x-1}{x^3}$
(ii) $y = \sin x$.