

JULY 2023
EBS 301
CALCULUS
30 MINUTES

Candidate's Index Number
Signature:

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
SCHOOL OF EDUCATIONAL DEVELOPMENT AND OUTREACH
INSTITUTE OF EDUCATION

COLLEGES OF EDUCATION
FOUR-YEAR BACHELOR OF EDUCATION (B.ED)
THIRD YEAR, FIRST SEMESTER MID-SEMESTER QUIZ, JULY 2023

28TH JULY 2023

CALCULUS

12:00 PM – 12:30 PM

Answer ALL the questions.
(20 MARKS)

Items 1 to 20 are stems followed by four options lettered A to D. Read each item carefully and circle the letter of the correct or best option.

- Which of the following quantities is **not** an indeterminate form?
 - 0/0
 - ∞/∞
 - $\infty + \infty$
 - $\infty - \infty$
- If $f(x) = xe^x$, find $f'(x)$.
 - e^x
 - xe^x
 - $(x + 1)e^x$
 - $(x + 2)e^x$
- If $f(x) = e^x g(x)$, where $g(0) = 2$ and $g'(0) = 5$, find $f'(0)$.
 - 2
 - 5
 - 7
 - 10

4. Given that g is a differentiable function, find an expression for the derivative of $y = xg(x)$.
- A. $g(x)$
 - B. $g(x) + xg'(x)$
 - C. $g'(x) + xg(x)$
 - D. $g'(x) + g(x)$
5. Suppose that $f(5) = 1$, $f'(5) = 6$, $g(5) = -3$ and $g'(5) = 2$. Find $(fg)'(5)$.
- A. -18
 - B. -16
 - C. 12
 - D. 16
6. If g is differentiable, find an expression for $\frac{d}{dx} \left(\frac{1}{g(x)} \right)$.
- A. $-\frac{1}{g(x)}$
 - B. $-\frac{g'(x)}{(g(x))^2}$
 - C. $\frac{1}{g(x)}$
 - D. $\frac{g'(x)}{(g(x))^2}$
7. Determine $\frac{d}{dx} \left(\frac{h(x)}{x} \right)$, if $h(2) = 4$ and $h'(2) = -3$.
- A. -3.5
 - B. -2.5
 - C. 2.5
 - D. 3.5
8. Suppose that $f(4) = 2$, $g(4) = 5$, $f'(4) = 6$ and $g'(4) = -3$. Find $h'(4)$, if $h(x) = \frac{f(x)}{g(x)}$.
- A. $-\frac{36}{25}$
 - B. $-\frac{24}{25}$
 - C. $\frac{24}{25}$
 - D. $\frac{36}{25}$
9. Given $f(x) = \frac{x}{e^{x^2}}$, determine $f'(0)$.
- A. -1
 - B. 0
 - C. 1
 - D. 2

10. Find the derivative of the function $f(x) = \sqrt{2x+1}$.
- $\frac{1}{2\sqrt{2x+1}}$
 - $\frac{1}{\sqrt{2x+1}}$
 - $\frac{2}{2\sqrt{2x+1}}$
 - $\sqrt{2x+1}$
11. At what point on the curve $y = \sqrt{1+2x}$ is the tangent line perpendicular to the line $6x + 2y = 1$?
- (1, 2)
 - (2, 1)
 - (3, 4)
 - (4, 3)
12. If $h(x) = f(g(x))$, where $f(-2) = 8$, $f'(-2) = 4$, $f'(-5) = 3$, $g(5) = -2$ and $g'(5) = 6$, find $h'(5)$.
- 16
 - 8
 - 24
 - 48
13. Find $f'(x)$, if $f(x) = (2x^3 + 5)^4$.
- $(2x^3 + 5)^3$
 - $4(2x^3 + 5)^3$
 - $6x^2(2x^3 + 5)^3$
 - $24x^2(2x^3 + 5)^3$
14. Find $\frac{dy}{dx}$ by implicit differentiation if $xy = \sqrt{x^2 + y^2}$.
- $\frac{x-xy^2}{x^2y-y}$
 - $\frac{x^2y-y}{x-xy^2}$
 - $\frac{xy^2-x}{x^2y-y}$
 - $\frac{x+xy^2}{x^2y+y}$
15. If $f(x) + x^2[f(x)]^3 = 10$, and $f(1) = 2$, find $f'(1)$.
- $-\frac{16}{13}$
 - $\frac{16}{13}$
 - $\frac{4}{3}$
 - $\frac{16}{11}$

16. Given that $f(x) = x^3 + 2x^2 + x - 1$, find $f''(2)$.
- A. 12
 - B. 16
 - C. 21
 - D. 25
17. Evaluate $\lim_{x \rightarrow 1} \frac{x^a - 1}{x^b - 1}$, $b \neq 0$.
- A. a
 - B. b
 - C. a/b
 - D. ∞
18. Evaluate $\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$.
- A. 0
 - B. $1/2$
 - C. 1
 - D. ∞
19. Find $\lim_{x \rightarrow 0} x^3 e^{-x^2}$.
- A. 0
 - B. 1
 - C. 3
 - D. ∞
20. Find $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $a > 0$.
- A. a^{n-1}
 - B. na^{n-1}
 - C. a^n
 - D. ∞