MARCH 2021
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, MARCH 2021

MARCH 19, 2021 CALCULUS 12:00 PM – 12:30 PM

Answer ALL the questions.

For items 1 to 18, each stem is followed four options lettered A to D. Read each item carefully and circle the letter of the correct or best option.

1. The mathematical statement $f(x) \approx f(a) + f'(a)(x - a)$ is known as .....
   A. linear approximation of f at a.
   B. linear combination of f at a.
   C. linear differentiation of f at a.
   D. linear interpolation of f at a.

2. The position of a particle is given by the equation $f(t) = t^3 - 6t^2 + 9t$. What is the velocity after 2s?
   A. $-9m/s$
   B. $-3m/s$
   C. $3m/s$
   D. $9m/s$

3. Given $f(x) = \ln(x^2 + 1)$, find $f'(1)$.
   A. 0.5
   B. 1.5
   C. 2.5
   D. 3.5

4. Given that $f(x) = x^2e^{-3x}$ find $f'(0)$.
   A. 0
   B. 1
   C. 2
   D. 3

5. If f and g are both differentiable, then $(f.g)' = fg' + gf'$. This is known as .....
   A. Power Rule.
   B. Product Rule.
   C. Quotient Rule.
   D. Sum Rule.

6. Find the gradient function of $y = x^2 - \frac{1}{x^3}$.
   A. $2x - \frac{3}{x^4}$
   B. $2x + \frac{3}{x^4}$
   C. $2x - \frac{3}{x^2}$
   D. $2x + \frac{3}{x^2}$

7. Given that $f(x) = 3x^2 - 12x + 5$. If $f'(x) = -3$, find the value of x.
   A. $\frac{3}{2}$
   B. $\frac{5}{2}$
   C. 3
   D. 4

8. If the second derivative of a function f gives a linear function, then f is a .....
   A. Constant function.
   B. Cubic function.
   C. Quadratic function.
   D. Rational function.

9. Given that $y = (2x + 4)^6$, calculate $\frac{dy}{dx}$.
   A. $6(2x + 4)^5$
   B. $12(2x + 4)^5$
   C. $12(2x - 4)^6$
   D. $6(2x - 4)^5$

10. Given that $2x^3 + 3y^2 = 4xy$, find $\frac{dy}{dx}$.
    A. $\frac{y-2x^2}{2y-3x}$
    B. $\frac{3y-2x^2}{2y-3x}$
    C. $\frac{2y-3x^2}{3y-2x}$
    D. $\frac{2y-3x}{2y-3x^2}$

11. For what value(s) of x does the graph of $f(x) = \frac{1}{3}x^3 - x^2 + 3$ have/has a parallel to the x −axis?
    A. 0
    B. 2
    C. 0 and 2
    D. 0 and 3

12. Which of the following is an indeterminate form?
    A. $\infty \, x \, \infty$ or $(\infty)\,(\infty)$
    B. $\infty + \infty$
    C. $\infty - \infty$
    D. ∞^{∞}

13. Find $\lim_{x \to 0^+} x^x$.
    A. 0
    B. 1
    C. e
    D. ∞

14. Calculate $\lim_{x \to \infty} (e^x - x)$.
    A. 2
    B. e
    C. 3
    D. ∞

15. What type of indeterminate form is $\lim_{x \to 0^+} x \ln x$.
    A. Indeterminate difference.
    B. Indeterminate powers.
    C. Indeterminate product.
    D. Indeterminate quotient.

16. Evaluate $\lim_{x \to 0} \frac{e^x - x - 1}{x^2}$.
    A. -1
    B. 0
    C. $\frac{1}{2}$
    D. ∞

17. Evaluate $\lim_{x \to 1} \frac{x-1}{x^2 - 3x + 2}$.
    A. $-\frac{1}{2}$
    B. -1
    C. $\frac{1}{2}$
    D. 1

18. Evaluate $\lim_{x \to 9} \frac{x-9}{3 - \sqrt{x}}$.
    A. -6
    B. $\frac{0}{0}$
    C. 3
    D. 6

Items 19 and 20 are statements followed by Yes and No options. Read each item carefully and indicate whether it is True or False by circling the letter of the correct option.

19. Do we necessarily have to use quotient rule to differentiate $y = \frac{3x^2+2\sqrt{x}}{x}$ with respect to x?
    A. Yes
    B. No

20. Is the statement $\lim_{x\to 2} \frac{x^4-16}{x^2-4}$ indeterminate?
    A. Yes
    B. No