| Candidate's Index Number: |
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| 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)
### FIRST YEAR, END-OF-FIRST SEMESTER EXAMINATION, FEBRUARY, 2020

FEBRUARY 11, 2020          COLLEGE ALGEBRA          2:00 PM – 2:30 PM

This paper consists of two sections, A and B. Answer all the questions in Section A and THREE questions from Section B. Section A will be collected after the first 30 minutes.
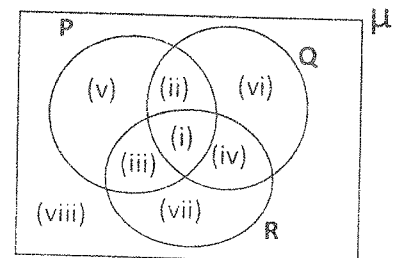
## SECTION A

### Answer ALL questions in this section.

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.

1. The Venn diagram below shows three intersecting subsets P, Q, and R of a universal set μ. Which one of the following regions represents $(P \cup Q)' \cap R$?
   A. (v)
   B. (vi)
   C. (vii)
   D. (viii)



2. Find the 20th term of the sequence defined by $a_n = n^2 - n$.
   A. 39
   B. 199
   C. 380
   D. 399

3. What is the quotient when the polynomial $f(x) = x^3 + 4x^2 + 11x - 30$ is divided by $(x-5)$?
   A. $x^2 - 3x - 6$
   B. $x^2 - 2x - 6$
   C. $x^2 + 2x - 6$
   D. $x^2 + 3x - 6$

4. Find the common ratio for the exponential sequence with $a_2 = 10$ and $a_4 = 40$.

    A. 2

    B. 3

    C. 6

    D. 9

5. Find the value of $y$ such that the determinant of the matrix $\begin{pmatrix} y & 7 \\ 3 & 2 \end{pmatrix}$ is 3.

    A. $-9$

    B. 9

    C. 12

    D. 24

6. A binary operation, $\Delta$, is defined on the set R, of real numbers by $a \, \Delta \, b = \dfrac{a}{b} - \dfrac{b}{a}$ where $a, b \in R$ and $a, b \neq 0$. Evaluate $2 \, \Delta \, \sqrt{2}$.

    A. $\dfrac{1}{\sqrt{2}}$

    B. $\dfrac{2}{\sqrt{2}}$

    C. $\dfrac{\sqrt{2}}{4}$

    D. $\dfrac{\sqrt{2}}{2}$

7. Which of the following logarithmic statements is true?

    A. $\dfrac{log5}{log3} = \log(\tfrac{5}{3})$

    B. $(log_2 y)^3 = 3log_2 y$

    C. $log_a(x + y) = log_a x + log_a y$

    D. $log_a(xy) = log_a x + log_a y$

8. Find the range of values that satisfy the inequality, $3 < 4x + 7 \leq 15$.

    A. $-2 < x < 4$

    B. $-1 < x < 4$

    C. $-1 < x < 2$

    D. $2 < x < 4$

9. Find the remainder when $P(x) = 3x^5 + 5x^4 - 4x^3 + 7x + 3$ is divided by $(x + 2)$.

    A. 1

    B. 5

    C. 31

    D. 37

10. Simplify $\dfrac{2}{1-y} + \dfrac{2}{1+y}$.

    A. $\dfrac{2}{1+y^2}$

    B. $\dfrac{2}{1-y^2}$

    C. $\dfrac{4}{1+y^2}$

    D. $\dfrac{4}{1-y^2}$

11. Solve for $x$ in the equation $3^{x-2} = 7$, correct to six decimal places.
    A. 0.771244
    B. 1.771243
    C. 2.771243
    D. 3.771244

12. Solve for $x$ in the logarithmic equation, $log_2(25 - x) = 4$.
    A. 8
    B. 9
    C. 17
    D. 19

13. A binary operation is defined by $x * y = x^2 - y^2 + xy$, where $x$ and $y$ are real numbers. Evaluate $\sqrt{5} * 2$.
    A. $\sqrt{5} - 4$
    B. $5 - 2\sqrt{5}$
    C. $\sqrt{5} + 1$
    D. $1 + 2\sqrt{5}$

14. Find the seventh term of the exponential sequence, $3, -\dfrac{3}{2}, \dfrac{3}{4}, ...$
    A. $\dfrac{3}{32}$
    B. $\dfrac{7}{32}$
    C. $\dfrac{3}{64}$
    D. $\dfrac{7}{64}$

15. What is the expansion of $(1 - 3x)^3$?
    A. $1 - 9x - 27x^2 - 9x^3$
    B. $1 - 9x - 27x^2 - 27x^3$
    C. $1 - 9x + 27x^2 - 27x^3$
    D. $1 - 9x + 27x^2 - 9x^3$

16. Which of the following expressions is the reduced form of $\dfrac{x^2 - x - 6}{3x + 6}$ ?

A. $\dfrac{1}{3}(x-3)$

B. $\dfrac{1}{2}(x-3)$

C. $\dfrac{1}{3}(x+3)$

D. $\dfrac{1}{2}(x+3)$

17. A worker's initial annual salary is GH¢850.00 and it is to be increased by GH¢110.00 a year. How much would the worker expect to earn in the eighth year?
   A. GH¢1,420.00
   B. GH¢1,520.00
   C. GH¢1,620.00
   D. GH¢1,720.00

18. If $(1 + \sqrt{2})^4 = a + b\sqrt{2}$, find the values of $a$ and $b$.
   A. $a = 12, b = 15$
   B. $a = 12, b = 17$
   C. $a = 17, b = 15$
   D. $a = 17, b = 12$

19. If $\log_3 5 = 1.465$, find, the value of $\log_3 25 + \log_3 15$.
   A. 3.930
   B. 4.395
   C. 4.930
   D. 5.395

20. Given the matrices $A = \begin{pmatrix} -2 & 5 \\ 4 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 4 & -3 \\ -6 & 5 \end{pmatrix}$, find AB.

A. $\begin{pmatrix} -38 & 31 \\ -2 & 3 \end{pmatrix}$

B. $\begin{pmatrix} -20 & -11 \\ -2 & 3 \end{pmatrix}$

C. $\begin{pmatrix} -20 & 11 \\ 32 & -15 \end{pmatrix}$

D. $\begin{pmatrix} -20 & -11 \\ 32 & -15 \end{pmatrix}$