

FIRST SEMESTER MATHEMATICS MID EXAM FOR GRADE 12 /

Time allowed: 2hr

1) choose the correct answer from the given options and write your answer on the answer sheet provided.

- Consider the sequence 97, 93, 89, 85....Which one of the following is true about the sequence?
 - The sequence can be continued arithmetically with difference 4.
 - The n^{th} term of the sequence is: $a_n = 101 - 4n$.
 - 60 is a term in the sequence.
 - The tenth term of the sequence is 51.
- Which one of the following sequence is not geometric?
 - 0.9, 0.99, 0.999, ...
 - 9, -3, -1, -1/3, -1/9, ...
 - 5, 5, 5, 5, ...
 - $2x, 4x^2, 8x^3, 16x^4, \dots, x \neq 0$
- If x , $4x+3$ and $7x+6$ are consecutive terms of a geometric progression, find the value(s) of x ?
 - 1, -1
 - 1
 - 2
 - 1, 2
- How many terms of geometric progression $3, 3^2, 3^3, \dots$ are needed to give the sum 120?
 - 3
 - 4
 - 5
 - 6
- Which one of the following is equal to the series $\sum_{n=1}^{\infty} (2n - 5)$?
 - $1+5+9+\dots$
 - $(1)+(-3)+(-7)+\dots$
 - $(1)+(-3)+(-7)+\dots$
 - $(-3)+(-1)+(1)+\dots$
- In the arithmetic sequence: -1, n , 13, ... which one of the following is the value of n ?
 - 7
 - 6
 - 9
 - 8
- Which term of the following, the geometric sequence 2, 8, 32, 128, ... is 2048?
 - 11^{th}
 - 12^{th}
 - 6^{th}
 - 7^{th}
- A man was injured in an accident at work. He receives a disability grant of birr 4,800 in the first year. This grant increases with a fixed amount each year. What is the annual increase if he received a total of birr 143,500 over 20 years?
 - 160
 - 335
 - 324
 - 250
- Which one of the following is the sum of the first n -even natural numbers?
 - n^2
 - $\frac{n+n^2}{2}$
 - $n^2 + n$
 - $n^2 - n$
- If $1, x$ and y are in Geometric progression and $Y-X-1$, $Y-X+1$ and $y+x-1$ are in Arithmetic Progression, then which of the following is not true?
 - The A.P is a decreasing sequence.
 - The common difference and the common ratio are equal.
 - $X+y+1$ is a term in the A.P.
 - The G.P is an increasing sequence.
- What is the sum of the infinite series $\sum_{k=0}^{\infty} 5 \left(\frac{2^k + 5^k}{10^k} \right)$?
 - 15
 - $\frac{65}{4}$
 - 5
 - $\frac{25}{4}$
- Which one of the following is the sum of the first K odd natural numbers?
 - $K^2 - 1$
 - K^2
 - $2K - 1$
 - $K - 1$
- Petros deposits birr 3500 in a bank account paying in an annual interest at a rate of 7%. What is the amount he has at the end of the second year?
 - 3745.4 birr
 - 4007.15 birr
 - 4555.25 birr
 - 4200.34 birr
- If the 10^{th} term of an arithmetic sequence is $\{A_n\}$ with a common difference 30 is 1300, which one of the following is its n^{th} term?

- A. $1060+30n$ B. $1000+60n$ C. $1030+30n$ D. $1000+30n$
15. The sum of the first 8 terms of a geometric sequence with first term 0.3 and common ratio $\frac{1}{10}$ is equal to: A. $\frac{1}{3}(\frac{10^8-1}{10^8})$ B. $\frac{3}{10}(\frac{10^8-1}{10^8})$ C. $\frac{3}{10}(\frac{10^8-1}{10^9})$ D. $\frac{1}{3}(\frac{10^8-1}{10^7})$
16. Consider the sequence $a_n = (-1)^n \cdot \frac{n^2}{2}$, $n = 1, 2, 3, \dots$ which one of the following is true about the sequence?
 A. Its seventh term is $49/2$.
 B. All its values are positive.
 C. All its values are negative.
 D. Its tenth term is 50.
17. What is the sum of the first 32 terms of the sequence 7, 2, -3, -8, ...?
 A. 2704 B. -2368 C. 2592 D. -2256
18. For what values of x , the function $f(x) = \frac{x^2+x+1}{x^2-x+1}$ has a local minimum? A. -1 B. 0 C. 3 D. 1
19. If $f(x) = x^3 + ax + b$ has a relative minimum value of 4 at $x=2$, then find a and b ?
 A. $a=20$ and $b=-12$ C. $a=-12$ and $b=20$
 B. $a=-20$ and $b=12$ D. $a=-12$ and $b=-20$
20. What is the absolute maximum point of the function $f(x) = \frac{x^2-2x+4}{x-2}$, $[-3, 1]$
 A. (0, -2) B. (-3, 5) C. (2, 4) D. (4, -19)
21. Which one of the following is the equation of the tangent line and the normal line respectively to the graph of the function $f(x) = x^3 - 2x$ at a point (1, -1)?
 A. $Y = X - 1$ and $y = x$ C. $Y = 2 - x$ and $y = -x$
 B. $Y = x - 2$ and $y = -x$ D. $Y = x - 2$ and $y = x$
22. One of the following is not true about the function $f(x) = 3x^5 - 5x^3 + 1$?
 A. f has a local maximum at $x = -1$.
 B. f has a local minimum at $x = 1$ and $x = 0$.
 C. f is decreasing on the interval $[-1, 1]$.
 D. The critical numbers are -1, 0, and 1.
23. What is the absolute minimum value of the function $f(x) = x^3 - 3x^2$ on $[-1, 3]$? A. 0 B. 4 C. -2 D. -4
24. If $h(x) = \sqrt{1 + \sqrt{x}}$, then which of the following is equal to $h'(x)$?
 A. $\frac{1}{2\sqrt{1+\sqrt{x}}}$ C. $\frac{1}{4\sqrt{x+x\sqrt{x}}}$
 B. $\frac{x}{4\sqrt{x+x\sqrt{x}}}$ D. $\frac{x}{2\sqrt{1+\sqrt{x}}}$
25. What is the absolute maximum value of the function $f(x) = x^4 - 2x^2$ on $[-2, 1]$?
 A. 8 B. 24 C. 12 D. 40
26. At what value of x does the function $f(x) = \frac{4}{3}x^3 - x^4$ attains its maximum value? A. 1 B. -1 C. 0 D. $4/3$
27. Which of the following is the set of all critical numbers of $f(x) = x + \frac{1}{x}$?
 A. $\{-1, 0, 2\}$ C. $\{-1, 1\}$
 B. $\{-1, 0, 1\}$ D. $\{1\}$
28. On which of the following intervals is the graph of $f(x) = x^3 - 3x^2 - 24x + 1$ decreasing?
 A. $(-\infty, -2]$ C. $[-2, 4]$
 B. $(-2, 3)$ D. $(4, \infty) \cup (-\infty, -2]$
29. Which one of the following is a correct statement about the function $f(x) = x^3 - 3x^2 + 3x$?
 A. It is decreasing on the interval $[1, \infty)$.
 B. It is increasing only on the interval $(-\infty, 1]$.
 C. The graph of $f(x)$ has no relative extreme at $x=1$.
 D. The graph of $f(x)$ has a relative minimum value at $x=-1$.

- A. $\{-2, 2\}$ C. $\{-1, 0, 1\}$
 B. $\{-2, 0, 2\}$ D. $\{-1, 1\}$
31. If $f(x) = ax^3 + \frac{b}{x} + 5$ has local minimum at $(2, -3)$, what are the values of a and b ?
 A. $a = -1/4, b = 12$ C. $a = 1/4, b = 12$
 B. $a = 1/4, b = -12$ D. $a = -1/4, b = -12$
32. If $f(x) = \pi^2 + 1$, then what is the value of $D f(x)$? A. $2\pi + 1$ B. 2π C. 2 D. 0
33. What is the equation of the tangent line to the graph of $f(x) = 3x^2 + 4x - 5$ at $(1, 2)$?
 A. $10x - y - 8 = 0$ C. $-10x - y - 8 = 0$
 B. $-10x + y - 8 = 0$ D. $10x + y - 8 = 0$
34. If $x^2 + xy = 10$, then what is the value of $\frac{dy}{dx}$ when $x = 2$? A. $-7/2$ B. $2/7$ C. $3/2$ D. $7/2$
35. Let $f(x) = \frac{1}{(1-\sqrt{x})^2}$, then $\frac{dy}{dx}\bigg|_{x=4}$ is equal to: A. $-1/2$ B. $1/2$ C. 2 D. 1
36. A candle has a starting length of 15cm. Thirty minutes after lighting it; the length became 5 cm. how long the candle takes to completely burn out.
 A. 45 minutes C. 70 minutes
 B. 1:40 minutes D. 40 minutes
37. What is the instantaneous rate of change of $f(x) = 2x^2 + 10$ at $x = -3$? A. 12 B. 10 C. -12 D. -8
38. The slope of a secant line to the graph of the function $f(x) = x^3 - 4x + 6$ over the interval $[1, 2]$
 A. -5 B. 6 C. -3 D. 3
39. If $f(x) = x^2$, find the gradient of the tangent line to the graph of $f(x)$ at the point $P(a, a^2)$?
 A. $2a$ B. $3a^2$ C. $2a^2$ D. a^3
40. Which one is the derivative of the function $f(x) = (3x^2 + 2)^2$?
 A. $12x^2 + 4$ C. $36x^3 + 24x$
 B. $6x^2 + 4$ D. $36x^2 + 24$
41. If $f(x) = \frac{2x^4}{\sqrt{x}}$, then find $\frac{dy}{dx}\bigg|_{x=1}$ A. $7/2$ B. $7\sqrt{3}$ C. 21 D. 7
42. What is the relative maximum value of the function $f(x) = \frac{x^2 + x + 1}{x^2 - x + 1}$?
 A. 1 B. $1/3$ C. 3 D. -1

Answer sheet

Name _____

sec _____

R.no _____

SET BY: SHIME AJ