

EDUCATIONAL ASSESSMENT AND EXAMINATION
IN OROMIA EDUCATION BUREAU
GRADE 12 FIRST SEMESTER MATHEMATICS MODEL EXAMINATION

FIRST SEMESTER MODEL EXAMINATION

Amajji, 2017 E.C, JANUARY 2025 G.C

TIME ALLOWED: **3:30 HOURS**

GENERAL DIRECTIONS

This booklet contains FIRST SEMESTER MATHEMATICS MODEL EXAMINATION.

In this examination, there are a total of 70 MULTIPLE CHOICE QUESTIONS. CAREFULLY SELECT THE BEST ANSWER and BLANKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. Follow the instructions on the answer sheet and the examination paper carefully. Use only PENCIL to mark your answers. Your answer mark should be HEAVY and DARK, covering the answer space completely. Please erase all unnecessary marks completely including answers you have changed from your answer sheet.

You are allowed to work on the exam for 3:30 HOURS. When time is called, you must immediately stop working, put your pencil down, and wait for future instructions.

Any form of cheating or the attempt to cheat in the examination will result in an automatic dismissal from the examination hall and cancellation of your score(s).

Please make sure that you have written all the required information on the answer sheet before you start to work on the examination.

DO NOT TURN THIS PAGE OVER UNTIL YOU ARE TOLD TO DO SO.

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1. Let R be a relation defined by $R = \{(x, y) : y = x^3 - 2x \text{ and } x \in \{-2, 0, 1, 2\}\}$. Then which of the following is true about the relation R ?
- A. $Dom(R) = \{-4, -1, 0, 4\}$ C. $Range(R) = \{-2, 0, 1, 2\}$
- B. $R = \{(-2, -4), (0, 0), (1, -1), (2, 4)\}$ D. $R = \{(-4, -2), (0, 0), (-1, 1), (4, 2)\}$
2. Consider the relation $R = \{(-3, 3), (5, -2), (0, 10), (2, -2), (5, 4)\}$. Then which of the following is R^{-1} ?
- A. $\{(-3, 3), (5, -2), (0, 10), (2, -2), (5, 4)\}$ C. $\{-3, 0, 2, 5\}$
- B. $\{-2, 3, 4, 10\}$ D. $\{(3, -3), (-2, 5), (10, 0), (-2, 2), (4, 5)\}$
3. Given a power function of the form $f(x) = x^{\frac{m}{n}}$, where m is an even natural number and n is an odd natural number. Then which of the following is true about the function f ?
- A. The graph of f is symmetric with respect to the y -axis.
- B. The domain of the function f is $[0, \infty)$.
- C. The range of the function f is $\mathbb{R}$.
- D. The values of f lie below the x -axis for negative values of x .
4. Let $f(x) = x^2 + 3x$ and $g(x) = 10x - 7$. Then what is the value of $(g \circ f)(2)$?
- A. 208 C. 93
- B. 10 D. 13
5. The graph of the inverse function can be obtained by reflecting the graph of the function through which of the following line?
- A. $y = -x$ C. y -axis
- B. x -axis D. $y = x$
6. A certain production company invested the initial capital of Birr 10,000. The variable cost of each item is Birr 5. If the company produces x items, then what is the relation between total cost y and the number of items produced?
- A. $x = 5y + 10,000$ C. $y = 5x + 10,000$
- B. $x = 5y - 10,000$ D. $y = 5x - 10,000$
7. Which of the following is a rational expression?
- A. $x^{-2} + \sqrt{2x}$ C. $\frac{x+1}{\sqrt{x^2+1}}$
- B. $\frac{x+1}{x^2+1}$ D. $2x^3 - x^{\frac{1}{2}} + 10$
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8. Given the rational expression $\frac{x+1}{x^2+7x+12}$. What is the domain of the expression?
- A. $\{x \in \mathbb{R} : x \neq -3 \text{ and } x \neq -4\}$ C. $\{x \in \mathbb{R} : x \neq -1, x \neq -3, \text{ and } x \neq -4\}$
 B. $\{x \in \mathbb{R} : x \neq -1, x \neq 3, \text{ and } x \neq 4\}$ D. $\{x \in \mathbb{R} : x \neq 3 \text{ and } x \neq 4\}$
9. What is the simplified form of $\frac{x+1}{x-3} + \frac{4-x}{x+2}$?
- A. $\frac{-x^2+3x+4}{2x-1}$ C. $\frac{10x-10}{x^2-x-6}$
 B. $\frac{5}{x^2-x-6}$ D. $\frac{5}{2x-1}$
10. Consider the inequality $\frac{x^2+2x-3}{x+2} \leq 0$. Then which of the following is the solution set of the inequality?
- A. $(-\infty, -3] \cup [1, \infty)$ C. $[-3, -2) \cup [1, \infty)$
 B. $[-3, -2) \cup (-2, 1]$ D. $(-\infty, -3] \cup (-2, 1]$
11. Which of the following is true about the graph of the function $f(x) = \frac{2}{x+1}$?
- A. The graph has a vertical asymptote at $x = 1$.
 B. The graph intersects the y -axis at $y = 2$.
 C. The negative y axis is the vertical asymptote to the graph of f .
 D. The graph has a horizontal asymptote at $y = 2$.
12. In one morning, if the shadow of a building of 15 meters long is 12 meters, then how long is the shadow of a tree of 35 meters long in meters?
- A. 28 C. 30
 B. 20 D. 17
13. What is the size of the matrix $\begin{pmatrix} 2 & -1 & 4 \\ 9 & 5 & -3 \end{pmatrix}$?
- A. 2×3 C. 2×2
 B. 3×2 D. 3×3
14. Let two matrices $P = \begin{pmatrix} 6 & -3 & 2 \\ -2 & 1 & 9 \end{pmatrix}$ and $Q = \begin{pmatrix} -2 & -3 & 5 \\ 4 & -8 & 12 \end{pmatrix}$ be given. Then what is the matrix $Q - 2P$?
- A. $\begin{pmatrix} -8 & 0 & 3 \\ 6 & -9 & 3 \end{pmatrix}$ C. $\begin{pmatrix} 4 & -6 & 7 \\ 2 & -7 & 21 \end{pmatrix}$
 B. $\begin{pmatrix} -14 & 3 & 1 \\ 8 & -10 & -6 \end{pmatrix}$ D. $\begin{pmatrix} 10 & -9 & 9 \\ 0 & -6 & 30 \end{pmatrix}$
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15. Let P be a square matrix of order n and P^t be its transpose. If P is a symmetric matrix, then which of the following is true?

A. $P = -\frac{1}{2}P^t$

C. $P = -P^t$

B. $P = \frac{1}{2}P^t$

D. $P = P^t$

16. Let $P = \begin{pmatrix} 2 & -4 & 9 \\ 5 & 3 & -1 \\ -3 & 7 & 6 \end{pmatrix}$ be given. If the elementary row operation $R_1 \rightarrow R_1 - 2R_3$ is applied to the matrix P , then what is the resulting matrix?

A. $\begin{pmatrix} 8 & 10 & -3 \\ 5 & 3 & -1 \\ -3 & 7 & 6 \end{pmatrix}$

C. $\begin{pmatrix} 8 & -18 & -3 \\ 5 & 3 & -1 \\ -3 & 7 & 6 \end{pmatrix}$

B. $\begin{pmatrix} 8 & -18 & -3 \\ 5 & 3 & -1 \\ -6 & 14 & 12 \end{pmatrix}$

D. $\begin{pmatrix} 8 & 10 & -3 \\ 5 & 3 & -1 \\ -3 & 7 & 6 \end{pmatrix}$

17. Consider the system of linear equations $\begin{cases} x - 2y + z = 7 \\ 2x + y - 3z = 4 \\ 3y + 4z = 5 \end{cases}$. Which of the following is the augmented matrix of the system?

A. $\left(\begin{array}{ccc|c} 1 & -2 & 1 & 7 \\ 2 & 1 & -3 & 4 \\ 3 & 4 & 5 & 0 \end{array} \right)$

C. $\left(\begin{array}{ccc|c} 1 & -2 & 1 & 7 \\ 2 & 1 & -3 & 4 \\ 3 & 4 & 0 & 5 \end{array} \right)$

B. $\left(\begin{array}{ccc|c} 1 & -2 & 1 & 7 \\ 2 & 1 & -3 & 4 \\ 0 & 3 & 4 & 5 \end{array} \right)$

D. $\left(\begin{array}{ccc|c} 1 & -2 & 1 & 7 \\ 2 & 1 & -3 & 4 \\ 3 & 4 & 0 & 0 \end{array} \right)$

18. Consider the system of linear equations $\begin{cases} -3x - 5y + z = 11 \\ 2x - 8y - 6z = 13 \end{cases}$ be given. Which of the following is true about the solution of the system?

A. The system has no solutions.

B. The system has exactly one solution.

C. The system has infinitely many solutions.

D. The system has finite number of solutions.

19. If P and Q are two different invertible matrices of the same size, then which of the following is true about the two matrices?

- A. $(P^t)^{-1} = (P^{-1})^t$ C. $(PQ)^{-1} \neq Q^{-1}P^{-1}$
B. $(P^{-1})^{-1} \neq P$ D. $P^{-1} = Q^{-1}$

20. The perimeter of a triangle is 30 cm. The measure of the shortest side is 10 cm less than the longest side. The measure of the middle side is 6 cm less than the sum of the other sides. Then what are the sides of the triangle?

- A. 5 cm, 12 cm, 13 cm C. 6 cm, 10 cm, 14 cm
B. 4 cm, 10 cm, 16 cm D. 4 cm, 12 cm, 14 cm

21. What is the determinant of the matrix $\begin{pmatrix} a & b \\ -c & d \end{pmatrix}$?

- A. $ab + cd$ C. $bc - ad$
B. $ad + bc$ D. $ac - bd$

22. Let the matrix $P = \begin{pmatrix} -6 & 2 \\ -4 & 3 \end{pmatrix}$ be given. Then what is the matrix of cofactors of P ?

- A. $\begin{pmatrix} 3 & 4 \\ -2 & -6 \end{pmatrix}$ C. $\begin{pmatrix} -3 & -4 \\ 2 & 6 \end{pmatrix}$
B. $\begin{pmatrix} -6 & 2 \\ -4 & 3 \end{pmatrix}$ D. $\begin{pmatrix} 6 & -2 \\ 4 & -3 \end{pmatrix}$

23. Let P and Q be square matrices of the same size 3×3 . Then which of the following is true about the determinants of the matrices?

- A. $\det(P) \neq \det(P^t)$ C. $\det(2P) = 6\det(P)$
B. $\det(PQ) = \det(P) + \det(Q)$ D. $\det(P^2) = (\det(P))^2$

24. Let P be a square matrix of order n having a non-zero determinant. Then which of the following is true about the inverse of P ?

- A. $P^{-1} = \det(P)(\text{Adj}(P))$ C. $P^{-1} = \frac{1}{\det(P)}(\text{Adj}(P))$
B. $P^{-1} = \text{Adj}(P)$ D. $P^{-1} = \frac{1}{\text{Adj}(P)}\det(P)$

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25. Let the system of linear equations $\begin{cases} 2x + y = 7 \\ -5x - 3y = 9 \end{cases}$ be given. Then what are the values of x and y , respectively?

A. $x = \frac{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}{\begin{vmatrix} 2 & 7 \\ -5 & 9 \end{vmatrix}}, y = \frac{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}{\begin{vmatrix} 7 & 1 \\ 9 & -3 \end{vmatrix}}$

C. $x = \frac{\begin{vmatrix} 2 & 7 \\ -5 & 9 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}, y = \frac{\begin{vmatrix} 7 & 1 \\ 9 & -3 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}$

B. $x = \frac{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}{\begin{vmatrix} 7 & 1 \\ 9 & -3 \end{vmatrix}}, y = \frac{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}{\begin{vmatrix} 2 & 7 \\ -5 & 9 \end{vmatrix}}$

D. $x = \frac{\begin{vmatrix} 7 & 1 \\ 9 & -3 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}, y = \frac{\begin{vmatrix} 2 & 7 \\ -5 & 9 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ -5 & -3 \end{vmatrix}}$

26. Let the points $P = (2, 1)$, $Q = (-3, 4)$ and $R = (0, 5)$ be the vertices of a triangle. Then what is the area of the triangle $\triangle PQR$ in square units?

A. 7

C. 18

B. 14

D. 36

27. Which of the following is a scalar quantity?

A. Displacement

C. Time

B. Force

D. Velocity

28. If two points $P = (3, -8)$ and $Q = (-11, 9)$ are given, then which of the following is the positional vector from P to Q ?

A. $(14, -17)$

C. $(-7, \frac{17}{2})$

B. $(-14, 17)$

D. $(7, -\frac{17}{2})$

29. Which of the following vectors is a unit vector?

A. $\frac{\sqrt{2}}{2}i - \frac{\sqrt{2}}{2}j$

C. $i + j$

B. $\sqrt{2}i + \sqrt{2}j$

D. $2i - \frac{1}{2}j$

30. If $\mathbf{u}$ and $\mathbf{v}$ are two vectors in three dimensional space, then which of the following is true about the cross product of the two vectors?

A. $\mathbf{u} \times \mathbf{v}$ is parallel to both $\mathbf{u}$ and $\mathbf{v}$.

B. $\mathbf{u} \times \mathbf{v}$ is in the plane of both $\mathbf{u}$ and $\mathbf{v}$.

C. $\mathbf{u} \times \mathbf{v}$ is perpendicular to both $\mathbf{u}$ and $\mathbf{v}$.

D. $\mathbf{u} \times \mathbf{v}$ is the same as the dot product of $\mathbf{u}$ and $\mathbf{v}$.

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31. If $\mathbf{u}$ and $\mathbf{v}$ are two vectors in two dimensional space, then which of the following is true about the angle θ formed between the two vectors?
- A. $\mathbf{u} \cdot \mathbf{v} = |\mathbf{u}||\mathbf{v}| \sin \theta$ C. $\mathbf{u} \cdot \mathbf{v} = -|\mathbf{u}||\mathbf{v}| \cos \theta$
B. $\mathbf{u} \cdot \mathbf{v} = -|\mathbf{u}||\mathbf{v}| \sin \theta$ D. $\mathbf{u} \cdot \mathbf{v} = |\mathbf{u}||\mathbf{v}| \cos \theta$
32. A translation takes a point $(1, 2)$ to $(3, 3)$. Then what is the equation of the image of the circle whose equation $x^2 + y^2 = 25$?
- A. $(x + 2)^2 + (y + 1)^2 = 25$ C. $(x - 2)^2 + (x - 1)^2 = 25$
B. $(x - 1)^2 + (y - 2)^2 = 25$ D. $x^2 + y^2 = 25$
33. Let the point $P = (4, 6)$ be reflected about the line $L : y = -3x + 2$. Then what is the image of the point P ?
- A. $(\frac{14}{5}, -\frac{7}{5})$ C. $(\frac{28}{5}, -\frac{14}{5})$
B. $(-\frac{28}{5}, \frac{14}{5})$ D. $(-\frac{14}{5}, \frac{7}{5})$
34. Let a point (x, y) be rotated counter-clockwise direction through the angle $\theta = \frac{\pi}{2}$. Then what is the image of the point?
- A. $(y, -x)$ C. $(x, -y)$
B. $(-x, y)$ D. $(-y, x)$
35. The point $P = (-4, 7)$ is reflected over the x -axis and then rotated through 180° counter-clockwise direction about the origin. Then what is the image of the point P ?
- A. $(4, 7)$ C. $(7, -4)$
B. $(-4, -7)$ D. $(7, 4)$
36. Which of the following data is classified as qualitative data?
- A. Number of female students in a class
B. Student's family educational qualification
C. Amount of money you have in a bank
D. Students' mathematics final examination scores
37. Which of the following data is a discrete data?
- A. Number of football players in a club C. Weight of a person
B. Height of a student in a class D. Volume of a milk in a glass

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38. The following raw data represents grade 12 students' 10% Mathematics test achievements: 8, 1, 7, 3, 2, 9, 10, 6, 3, 5, 5, 6, 9, 9, 9, 3, 7, 4, 8, 2, 3, 5, 4, 4, 10, 1, 7, 3, 2, 10

If we want to group them into 5 classes, then which of the following are respectively the class width to the nearest whole number and frequency of the 5th class?

- A. 1 and 5
B. 2 and 6
C. 1 and 8
D. 2 and 7
39. On a certain construction site, the weekly wages (in birr) of 120 daily laborers taken from ungrouped data in which the highest observed wage birr 3246 and the lowest wage was birr 2430 are required to be given in 8 categories of frequency distribution as shown in the table below:

Weekly wage (in Birr)	Number of laborers
$2430 \leq x < 2532$	21
$2531 \leq x < 2634$	15
$2634 \leq x < 2736$	14
$2736 \leq x < 2838$	22
$2838 \leq x < 2940$	20
$2940 \leq x < 3042$	10
$3042 \leq x < 3144$	11
$3144 \leq x \leq 3246$	7

Which of the following is NOT TRUE?

- A. 84 laborers are weekly paid Birr 2634 and more
B. 36 laborers are paid weekly below Birr 2634
C. 102 laborers are paid below Birr 3042 weekly
D. 113 laborers are paid Birr 3042 weekly
40. A graph that is constructed by using the lines to join the mid points of each intervals of grouped frequency distribution is
- A. Histogram
B. Bar-graph
C. Frequency polygon
D. Cumulative Frequency curve

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41. The following grouped frequency distribution shows 50% first semester grade 11 mathematics Final examination scores of 45 students

Scores	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50
Frequency	2	8	6	5	6	10	5	3

Which of the following is NOT TRUE?

- A. The mean score of 45 students is 30.78 C. The mode is 38.22
- B. The median is 32.25 D. 75th percentile is 33.75
42. Which of the following is always TRUE?
- A. The mean of a scores is equal to the median of the same scores
- B. The median of a scores is equal to the mode of the same scores
- C. The 6th decile of a scores is equal to the 60th percentile of the same scores
- D. The 1st quartile of a score is equal to the 75th percentile of the same scores
43. In how many different ways can we arrange 10 students in a table of three seats for photo?
- A. 720 ways C. 120 ways
- B. 90 ways D. 30 ways
44. In how many ways 5 teachers and 5 students make a discussion on problem solving around a circular table, if no two students are to seat together?
- A. 14,400 ways C. 120 ways
- B. 2,880 ways D. 576 ways
45. How many different ways can a person invite one or more of his 10 friends to his wedding ceremony?
- A. 10 ways C. $10!$ ways
- B. 210 ways D. 1023 ways
46. Using Pascal's triangle find the coefficient of x^4y^3 in the expansion of $(x - y)^7$.
- A. 35 C. -35
- B. 30 D. -30
47. If 5 books are picked at random from a shelf containing 4 Mathematics, 3 Physics, 2 Chemistry and 1 Biology books, what is the probability that when 2 Mathematics, 1 Physics, 1 Chemistry and 1 Biology books are picked?
- A. $\frac{1}{7}$ C. $\frac{5}{42}$
- B. $\frac{2}{21}$ D. $\frac{1}{9}$

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48. Let S be the sample space of a given random experiment, E, E_1 , and E_2 be events, and $P(S)$ be probability of the sample space S and $P(E)$ be probability of an Event E . Which of the following DOES NOT satisfy the Axiomatic Probability?
- A. $P(E_1 \cup E_2) = P(E_1) + P(E_2)$ if E_1 and E_2 are mutually exclusive events.
 - B. $P(S) > 1$.
 - C. $0 \leq P(E) \leq 1$.
 - D. If $E \cup E' = S$, then $P(E \cup E') = 1$.
49. In a group of 60 people, every person has either high blood pressure, high level of cholesterols or both. If 40 have high blood pressure and 38 have high level of cholesterols. What is the probability a people who have both high blood pressure and have high level of cholesterols in a group?
- A. $\frac{19}{30}$
 - B. $\frac{3}{8}$
 - C. $\frac{2}{3}$
 - D. $\frac{3}{10}$
50. Which of the following is true about any sequence?
- A. A sequence is a function whose domain is the set of all real numbers.
 - B. In the sequence a_n , the functional values $a_1, a_2, a_3, \dots, a_n, \dots$ are the terms of the sequence.
 - C. The domain of an infinite sequence is $\{-3, -2, -1, 0, 1, 2, 3, \dots\}$.
 - D. A finite sequence is a sequence that does not have a last term.
51. If the 24^{th} term and the 51^{st} terms of an Arithmetic progression are respectively 64 and 172, then which of the following is NOT TRUE about the arithmetic progression?
- A. The common difference is 4
 - B. The first term of the sequence is -28
 - C. The n^{th} term of the sequence is $4n + 32$
 - D. 0 is the 8^{th} term of the Arithmetic progression
52. Which of the following is true about a geometric sequence?
- A. the difference between any consecutive terms is a non-zero constant.
 - B. the ratio between any consecutive terms can be any constant.
 - C. the difference between any consecutive terms is any constant.
 - D. the ratio between any consecutive terms is a non-zero constant.

53. Which of the following is NOT TRUE about an infinite sequence a_n ?

- A. it diverges to positive infinity: as $n \rightarrow \infty$, $a_n \rightarrow \infty$
- B. it diverges to negative infinity: as $n \rightarrow \infty$, $a_n \rightarrow -\infty$
- C. it converges to c : as $n \rightarrow \infty$, $a_n \rightarrow c$, where $c \in \mathbb{R}$
- D. it converges where its value oscillates back and forth between two numbers

54. If the general term of a sequence is given by $\frac{5}{n^2+9n+20}$, which of the following is the sum of the first n terms, S_n , of the sequence?

- A. $S_n = \frac{n}{n+5}$
- B. $S_n = \frac{n}{4(n+4)}$
- C. $S_n = \frac{n}{5(n+5)}$
- D. $S_n = \frac{n}{4(n+5)}$

55. To what number the series $\sum_{n=1}^{\infty} \frac{20}{n^2+9n+20}$ converges?

- A. 20
- B. 4
- C. 5
- D. 1

56. What is the fraction form of the recurring decimal $0.\overline{36}$?

- A. $\frac{4}{111}$
- B. $\frac{9}{25}$
- C. $\frac{2}{5}$
- D. $\frac{4}{11}$

57. Which of the following is true about a negative rate of change?

- A. It is a rate of change when the value of two related quantities x and y increase at the same time.
- B. It is a rate of change when the value of two related quantities x and y decrease at the same time.
- C. It is a rate of change when the value of one quantity x increases and the other related quantity y decreases.
- D. It is a rate of change when the value of one quantity x increases and the other related quantity y remains constant.

58. Which of the following is true about the Gradient of a curve?

- A. It is the number that describes the steepness and direction of the line which intersects the curve at a point.
- B. It is the function that describes the monotonicity of the line which intersects the curve at a point.
- C. It is the function that describes the monotonicity of the line which intersects the curve at two points.
- D. It is the number that describes the steepness and direction of the line which intersects the curve at more than one point.

59. Which of the following is the derivative of $f(x) = \frac{-x}{\sqrt{x^2-1}}$?

- A. $f'(x) = \frac{1}{(\sqrt{x^2-1})^3}$
- B. $f'(x) = \frac{1}{\sqrt{x^2-1}}$
- C. $f'(x) = \frac{x^2-1}{\sqrt{x^2-1}}$
- D. $f'(x) = \frac{x}{(\sqrt{x^2-1})^3}$

60. Which of the following is the interval on which the function $f(x) = 2x^4 + 4x^3 + 2x^2 + 1$ is increasing?

- A. $(-\infty, -1) \cup [-\frac{1}{2}, 0]$
- B. $(-1, \frac{-1}{2}] \cup [0, \infty)$
- C. $(-\infty, \infty)$
- D. $[\frac{-1}{2}, 0]$

61. What is the equation of the line tangent to the graph of the function $f(x) = x^2 - 6x$ at the point $(3, -9)$?

- A. $y = -9$
- B. $y = 0$
- C. $x = 3$
- D. $x = 0$

62. Suppose the side of a square is increasing at the rate of 1.5 cm/s . Which of the following is the rate at which the area is increasing at the instant when the side is 7 cm ?

- A. $10.5 \text{ cm}^2/\text{s}$
- B. $24.5 \text{ cm}^2/\text{s}$
- C. $49 \text{ cm}^2/\text{s}$
- D. $21 \text{ cm}^2/\text{s}$

63. Which of the following is equal to the indefinite integral $\int \frac{3x-1}{2\sqrt{x}} dx$?

- A. $x(\sqrt{x} - 1) + C$
- B. $\frac{1}{2}x(\sqrt{x} - 1) + C$
- C. $\sqrt{x}(x - 1) + C$
- D. $2\sqrt{x}(x - 1) + C$

64. What is the area of the region enclosed by $f(x) = -x^2 + 1$ and $f(x) = x^2 - 1$ on the interval $[-2, 2]$?

A. 4

C. $\frac{8}{3}$

B. $\frac{16}{3}$

D. 8

65. Which of the following is Relative measure of dispersion?

A. Standard deviation

C. Inter-quartile range

B. Coefficient of mean deviation

D. Median

66. Consider the data set: 8, 6, 3, 7, 9, 5, 6, 8, 4, 4. Which of the following is the mean deviation about the mean of the data?

A. 4

C. 16

B. 1.6

D. 3.6

67. Compute the variance of the grouped data from the table below

class	1 - 5	6 - 10	11 - 15	16 - 20
frequency	3	2	3	2

A. 10

C. 310

B. 5.6

D. 31

68. If the mean and standard deviation of the gross income of two companies are given below in a table,

Company	Mean	Standard deviation
X	50,000	10,000
Y	72,000	18,000

Which of the following is true about the two companies?

A. Company X has More variable income than Company Y

B. The coefficient of variation of company X is 0.002

C. The Income of Company X is more consistent than Company Y

D. The coefficient of variation of Company Y is 0.3

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69. Which of the following is NOT TRUE about the distribution of the given data set?
- A. The distribution is Symmetric if $Mean = Median = Mode$
 - B. The distribution is Positively Skewed if $Mean < Median < Mode$
 - C. The Skewness of the distribution gives the direction of its variability
 - D. The distribution is skewed to the left if $Mode > Median > Mean$
70. Which sampling technique is useful whenever the population under consideration has some identified categorical difference where each category is supposed to be homogeneous?
- A. Stratified Random Sampling
 - B. Systematic Random Sampling
 - C. Cluster Random Sampling
 - D. Simple Random Sampling

The End

Grade 12 Mathematics First Semester Model Examination 2017/2025**Answer Sheet**

Name: _____ ID. NO. _____ Section: _____

Number	A	B	C	D	Number	A	B	C	D
1.	☐	☐	☐	☐	36.	☐	☐	☐	☐
2.	☐	☐	☐	☐	37.	☐	☐	☐	☐
3.	☐	☐	☐	☐	38.	☐	☐	☐	☐
4.	☐	☐	☐	☐	39.	☐	☐	☐	☐
5.	☐	☐	☐	☐	40.	☐	☐	☐	☐
6.	☐	☐	☐	☐	41.	☐	☐	☐	☐
7.	☐	☐	☐	☐	42.	☐	☐	☐	☐
8.	☐	☐	☐	☐	43.	☐	☐	☐	☐
9.	☐	☐	☐	☐	44.	☐	☐	☐	☐
10.	☐	☐	☐	☐	45.	☐	☐	☐	☐
11.	☐	☐	☐	☐	46.	☐	☐	☐	☐
12.	☐	☐	☐	☐	47.	☐	☐	☐	☐
13.	☐	☐	☐	☐	48.	☐	☐	☐	☐
14.	☐	☐	☐	☐	49.	☐	☐	☐	☐
15.	☐	☐	☐	☐	50.	☐	☐	☐	☐
16.	☐	☐	☐	☐	51.	☐	☐	☐	☐
17.	☐	☐	☐	☐	52.	☐	☐	☐	☐
18.	☐	☐	☐	☐	53.	☐	☐	☐	☐
19.	☐	☐	☐	☐	54.	☐	☐	☐	☐
20.	☐	☐	☐	☐	55.	☐	☐	☐	☐
21.	☐	☐	☐	☐	56.	☐	☐	☐	☐
22.	☐	☐	☐	☐	57.	☐	☐	☐	☐
23.	☐	☐	☐	☐	58.	☐	☐	☐	☐
24.	☐	☐	☐	☐	59.	☐	☐	☐	☐
25.	☐	☐	☐	☐	60.	☐	☐	☐	☐
26.	☐	☐	☐	☐	61.	☐	☐	☐	☐
27.	☐	☐	☐	☐	62.	☐	☐	☐	☐
28.	☐	☐	☐	☐	63.	☐	☐	☐	☐
29.	☐	☐	☐	☐	64.	☐	☐	☐	☐
30.	☐	☐	☐	☐	65.	☐	☐	☐	☐
31.	☐	☐	☐	☐	66.	☐	☐	☐	☐
32.	☐	☐	☐	☐	67.	☐	☐	☐	☐
33.	☐	☐	☐	☐	68.	☐	☐	☐	☐
34.	☐	☐	☐	☐	69.	☐	☐	☐	☐
35.	☐	☐	☐	☐	70.	☐	☐	☐	☐