DEJAZMACH WONDIRAD SENOR SECONDARY SCHOOL

MATHEMATICS WORKSHEET UNIT 1-4

FIRST SEMESTER MATHEMATICS WORKSHEET (UNIT 1-4) FOR GRADE 11 (2018 E.C)

Write TRUE if the statement is correct and FALSE if it is incorrect

1. The solution of $| x - a | = x - b$ must satisfy $x \geq b$
2. If two determinants are equal, then the corresponding matrices must be identical.
3. The equation $\begin{vmatrix} x & 4 \\ 1 & 3x \end{vmatrix} = 20$ has two real solutions.
4. If A is a 3×2matrix and B is a 2×3 matrix, then both AB and BA are defined.
5. Every square matrix with zero diagonal entries is skew-symmetric.
6. In a skew-symmetric matrix A, the relation $a_{ij} = -a_{ji}$ holds for all $i \neq j$
7. If A is a scalar matrix of order 3 and $tr(A) = 6$, then $| A | = 8$.

Give short answers for the following problem

1. A is 3×4 matrix, if $A^T B$ and BA^T are defined, then B is a _____ matrix
2. If A skew – symmetric 3×3 matrix, $|A| =$ _____
3. If $\begin{pmatrix} x & 0 \\ 1 & y \end{pmatrix} - \begin{pmatrix} 2 & -4 \\ -3 & -4 \end{pmatrix} = \begin{pmatrix} 3 & 5 \\ 6 & 3 \end{pmatrix} - \begin{pmatrix} 2 & 1 \\ 2 & 1 \end{pmatrix}$, then $x =$ ____ and $y =$ ____
4. If $A = \begin{pmatrix} 2x & 0 \\ x & x \end{pmatrix}$ and $A^{-1} = \begin{pmatrix} 1 & 0 \\ -1 & 2 \end{pmatrix}$, then $x =$ ___
5. $\begin{bmatrix} 3 & 2 & 0 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ -2 & -1 & -1 \\ 1 & -4 & -3 \end{bmatrix} \begin{bmatrix} 3 \\ 2 \\ 0 \end{bmatrix} =$ [__]
6. The non-trivial solution of homogeneous systems of linear equation $\begin{cases} 3x + 2y + z = 0 \\ 2x - 2y = 0 \end{cases}$ is (___, ___, ___)
7. The solution set of the equation $|3x + 1| = 2|x + 2|$ is (are) _____
8. The rang of $f(x) = 4sgnx + 2\ is$ _____
9. Let $R = \{(x, y): y > x^2 + 1\ and\ y \geq 5\}$, then the domain of R^{-1} is _____
10. Let $A = \begin{pmatrix} -2 & x \\ y - 1 & 3 \end{pmatrix}$ and $B^T = \begin{pmatrix} x + 1 & 4 \\ -3 & y - 2 \end{pmatrix}$, then the values of x and y such that $A^T + B$ is a diagonal matrix. $x =$ ___ and $y =$ ____

Choose the best answer and write the letter of your choice on the space provided

1. Which of the following is a **rational expression**?

   A. $\frac{x^2+1}{\sqrt{x}+2}$ B. $\frac{2x+3}{x-1}$ C. $\frac{x}{\sqrt{x^2}}$ D. $\frac{x+1}{\sqrt{x}}$

2. The transpose of a row matrix of order 1×4 is:

   A. A square matrix B. A row matrix C. A column matrix D. A zero matrix

3. let $f(x) = -x^{\frac{5}{4}}$. Which of the following statements is **TRUE**?
   A. f is defined for all real numbers
   B. $f(x) > 0$ for all $x < 0$
   C. The range of f is $(-\infty, 0]$
   D. The domain of f is $\Re$
4. Let $f(x) = -2 - sgn(x-1)$.The **range** of $f(x)$ is:
   A. $\{-1,-2,-3\}$ B. $\{-3,-2,-1\}$ C. $\{-4,-3,-2\}$ D. $\{-2,-3\}$
5. Let $g(x) = |\,|\,x\,| - 2|$ Which of the following is **TRUE**?
   A. The range of $g(x)$is the set of all integers
   B. The range of $g(x)$ is the set of all integers less than or equal to -2
   C. The domain of $g(x)$ is $[2,\infty)$
   D. The function is undefined for negative values of x
6. Let $f(x) = 2x^2 - 1$ and $g(x) = \sqrt{x-1}$ The value of $(f \circ g)(5)$ is
   A. 7 B. 15 C. 17 D. 31

7. *Let* $f(x) = \sqrt{4-x}$ and $g(x) = x^2 + 1$ Which of the following is the **domain of** $(\boldsymbol{f \circ g})(\boldsymbol{x})$?
   A. $\Re$ B. $(-\infty, 1]$ C. . $[-\sqrt{3}, \sqrt{3},]$ D. $[-\sqrt{3}, \sqrt{3},] \cup \{0\}$
8. Let $f(x) = x^3 - 3x$ Which of the following statements is **TRUE**?
   A. f is invertible on $\Re$
   B. f is invertible on the interval $[1,\infty)$
   C. f is one-to-one on $\Re$
   D. $f^{-1}(x) = \sqrt[3]{x+3}$
9. Suppose f and g are functions such that $f(g(x)) = x$ for all $x \in \Re$ Which of the following must be TRUE?
   A. $f$is one-to-one but not onto
   B. Both f and g are one-to-one and onto
   C. g is one-to-one and f is onto
   D. g is onto but not one-to-one
10. A student saves **10 birr in the first week** and increases the savings by **5 birr each week**. How much money does the student save **in the 8th week**?
    A. 40 birr B. 45 birr C. 50 birr D. 55 birr
11. A student saves **15 birr per week**. After **n weeks**, the total amount saved is **225 birr**. The value of n is:
    A. 12 B. 13 C. 14 D. 15
12. A student saves **20 birr every week** for the first **6 weeks**. From the **7th week onward**, the student saves **5 birr more per week than before**. How much money does the student save **in total after 8 weeks**?
    A. 160 birr B. 165 birr **C.** 170 birr D. 180 birr
13. Decompose the rational expression $\frac{7x+5}{x^2+x-6}$. Which of the following is correct?

    A. $\frac{2}{x-2} + \frac{5}{x+3}$ B. $\frac{1}{x-2} + \frac{6}{x+3}$ C. $\frac{1}{x-2} + \frac{8}{x+3}$ D. $\frac{3}{x-2} + \frac{4}{x+3}$

14. The solution set of the inequality $\frac{(x-2)(x+3)}{(x-1)(x+4)} < 0$ is
    A. $(-4,-3) \cup (1,2)$ B. $(-3,-1) \cup (2,4)$ C. $(-4,-3) \cup (2,\infty)$ D. $(-\infty,-4) \cup (-3,1)$
15. A rational model of work completion time has a **vertical asymptote** at $x = 5$ and a **horizontal asymptote** at $t = 0$. Which real-life interpretation is **most accurate**?
    A. The job takes exactly 5 hours to complete
    B. The job cannot be completed with 5 workers
    C. The job will never require more than 5 workers
    D. The job always takes zero time when many workers are used
16. A production process is modeled by $t = \frac{6}{x-1} + 2$ Which of the following is **true**?
    A. The vertical asymptote is $t = 2$
    B. The horizontal asymptote is $x = 1$
    C. The model is undefined at $x = 1$
    D. Time decreases without bound as x increases
17. A graph of a job-completion model approaches the line $t = 2$ increases and is undefined at $x = 1$. Which function best represents the graph?
    A. $t = \frac{2}{x-1}$ B. $t = \frac{1}{x-1} + 2$ C. $t = \frac{3}{x-1} + 2$ D. $t = \frac{2}{x} + 1$

18. Let $A = \begin{pmatrix} 1 & 2 \\ -2 & 5 \end{pmatrix}$. If $A^2 - 6A + 9I_2 = 0$, the which of the following is true?

A. A is singular
C. $A^2 = 9I_2$
B. $A^{-1} = 6I_2 - A$
D. $A^{-1} = \frac{1}{9}(6I_2 - A)$

19. The augmented matrix $\begin{pmatrix} 1 & 3 & -2 & 4 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 0 \end{pmatrix}$ represents a system of linear equations. Which statement is **true**?

A. The system has **no solution**
C. The system has a **unique solution**
C. The system has **infinitely many solutions**
D. The system is **inconsistent**

20. If A^{-1} exists and $AX = B$ has the solution $X = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$, which of the following is **always true?**

A. $X = A + B$
B. $X = AB$
C. $X = A^{-1}B$
D. $X = BA^{-1}$

21. let $\begin{pmatrix} 1 & 2 \\ 3 & 5 \end{pmatrix}$, $X = \begin{pmatrix} x \\ y \end{pmatrix}$, $B = \begin{pmatrix} 7 \\ 18 \end{pmatrix}$. find X that satisfies $AX = B$

A. $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$
B. $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$
C. $\begin{pmatrix} 1 \\ 3 \end{pmatrix}$
D. $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$

22. Consider the system: $\begin{cases} x + 2y + 3z = 4 \\ 2x + 4y + 6z = 8 \\ -x - 2y - 3z = -4 \end{cases}$ Which of the following describes the solution set?

A. $\emptyset$
C. Unique solution $(1,0,1)$
B. $(x, y, z) = (k, 2 - k, 0), k \in \Re$
D. Infinitely many solutions: $(x, y, z) = (2 - 2k, k, k), k \in \Re$

23. A solution contains **x liters of 25% acid** and **y liters of 75% acid**. If the resulting mixture is **40% acid** and the total volume is **200 L**, which of the following systems correctly models the situation?

A. $\begin{cases} x + y = 200 \\ 0.25x + 0.75y = 80 \end{cases}$
B. $\begin{cases} x - y = 200 \\ 0.25x + 0.75y = 80 \end{cases}$
C. $\begin{cases} x + y = 200 \\ 0.25x + 0.75y = 40 \end{cases}$
D. $\begin{cases} x + y = 40 \\ 0.25x + 0.75y = 200 \end{cases}$

24. Which of the following statements is **TRUE**?

A. The function $f(x) = \frac{x+1}{3}$ has a horizontal asymptote at $y = 0$.
B. The function $f(x) = \frac{x^2-1}{x}$ has a vertical asymptote at $x = 2$
C. The function $f(x) = \frac{3x+4}{5-x}$ has a horizontal asymptote at $y = -3$.
D. The function $f(x) = \frac{x^2}{x+1}$ has no asymptote.

25. Which function has **x-intercepts at $x = \pm 2$**?

A. $f(x) = \frac{x}{3}$
B. $f(x) = \frac{x^2-4}{x+3}$
C. $(x) = \frac{3x+4}{5-x}$
D. $f(x) = \frac{x^2}{x+1}$

26. If $f(x) = \frac{x^2-x-2}{x^2-1}$, then which one of the following is **no**t true about the graph of $f(x)$?

A. The line $y = 1$is the horizontal asymptote
B. The line $x = -1$ and $x = 1$and are vertical asymptote
C. The intercept of the graph is $(2,0)$
D. The intercept of the graph is $(0,2)$