

Mathematics Work sheet

Sec _____ R.No _____

For Grade 11

Date March 2020

Instruction: Choose the correct answer from the given alternative

1. Assume $A = \begin{pmatrix} 4 & 0 \\ 1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 2 \\ 1 & 1 \end{pmatrix}$ And If X is a 2×2 matrix such $X + \frac{1}{2}B^T = AB$, then what is the value of X ?

A. $\begin{pmatrix} 7 & 5 \\ 1 & 1 \end{pmatrix}$

B. $\begin{pmatrix} 5 & -3 \\ 1 & 1 \end{pmatrix}$

C. $\begin{pmatrix} 5 & -3 \\ 1 & 1 \end{pmatrix}$

D. $\begin{pmatrix} 7 & 5 \\ 1 & 1 \end{pmatrix}$

2. Assume the matrix $A = \begin{pmatrix} x & 2x-1 \\ 1 & 1 \end{pmatrix}$ is invertible (non-singular) then possibly x can't be:

A. 1, 4/9

B. -1, 4/9

C. 1, -4/9

D. -1, -4/9

3. For a square matrix A , if $AA^T = A^T A = I$ where I is an identity matrix of same order as A then A is:

A. Identity matrix

B. Symmetric matrix

C. Orthogonal matrix

D. Zero matrix

4. What is the solution set of the system of equations

$$\begin{cases} x+y+z=1 \\ x+2y+z=2 \end{cases}$$

A. $\{(0,1,0)\}$

B. $(-\infty, \infty)$

C. $\{(-3k, k+1, k) : k \in R\}$

D. $\{(3k, k-1, k) : k \in R\}$

5. Consider the system of equations

$$\begin{cases} x-2y+z=-1 \\ x+y-2z=2 \end{cases}$$

this system of equations has:

A. Exactly one solution

B. Infinitely many solutions

C. No solutions

D. None of the above

$$A = \begin{vmatrix} 0 & x & 0 \\ 1 & -1 & 1 \end{vmatrix} \quad \text{and} \quad A^{-1} = \begin{vmatrix} 1 & 1 & 1 \\ 3 & 0 & 0 \end{vmatrix}$$

6. If $x \wedge y$ are inverse of one another what is the value of

$$A = \begin{vmatrix} 2 & 1 & 0 \\ 1 & 1 & 4 \end{vmatrix}$$

7. Consider the matrix then find :

i. The minor of a_{23}

ii. The cofactor of a_{32}

iii. The determinant of A that is $|A|$

$$A = \begin{vmatrix} 1 & -1 \\ 2 & 2 \end{vmatrix}$$

$$B = \begin{vmatrix} 3 & 1 \end{vmatrix}$$

8. Let and then find matrix D such that $DA = B$

$$A = \begin{vmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \end{vmatrix}$$

9. Find the inverse of the matrix

$$\begin{vmatrix} x+2y-3z+2w=2 \\ 2x+5y-8z+6w=5 \end{vmatrix}$$

10. Using matrix methods solve the system

$$\begin{vmatrix} 3x-2y+z=6 \\ 5x-8y+9z=3 \end{vmatrix}$$

11. Determine the value of $a \wedge b$ for which the system

i. Has unique solution

Has many solutions

Has no solutions

$$\begin{vmatrix} x+2y-4z=1 \\ 2x+y-5z=-1 \end{vmatrix}$$

12. Using Cramer's Rule show that the system has a unique solution also find the solution

13. Assume $A = \begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$. And If X is a 2×2 matrix such $AX - A^T = 2A$, then what is the value of X ?

B. $\begin{pmatrix} 3 & 1 \\ 3 & 1 \end{pmatrix}$

B. $\begin{pmatrix} 3 & 3 \\ 3 & 3 \end{pmatrix}$

C. $\begin{pmatrix} 3 & 6 \\ 3 & 6 \end{pmatrix}$

D. $\begin{pmatrix} 3 & 0 \\ 3 & 0 \end{pmatrix}$

14. For a square matrix A , which one is not true?

B. $A + A^T$ is symmetric matrix

C. $A + A^T$ is orthogonal

C. $A - A^T$ Skew-symmetric matrix

D. None of the above

15. Consider the matrices $A = \begin{pmatrix} -2 & 0 \\ x & y \end{pmatrix}$ and $B = \begin{pmatrix} 1-y & 0 \\ 0 & 3 \end{pmatrix}$ such that $A + 2B^T = 0$, then solve for y .

6. The simplified form of the expression $\frac{4-3i}{3+4i} + \overline{1-2i}$ is:

A. $1+i$

B. $1+3i$

C. $2-i$

D. $1-3i$

17. If $z = \cos\left(\frac{\pi}{10}\right) + i\sin\left(\frac{\pi}{10}\right)$ then $z^{10} = \text{-----}$.

A. $\frac{\frac{\pi}{2} + \frac{\pi}{2}i}{1+i}$

B. $\frac{1}{2} + \frac{1}{2}i$

C. -1

D.

18. Under the set of complex numbers, what will be the solution set of the equation $z^3 - iz = 0$?

A. $\left\{ \pm \frac{1}{\sqrt{2}}(1+i) \right\}$

B. $\left\{ 0, \pm \frac{1}{\sqrt{2}}(1-i) \right\}$

C. $\left\{ \pm \sqrt{2}(1+i) \right\}$

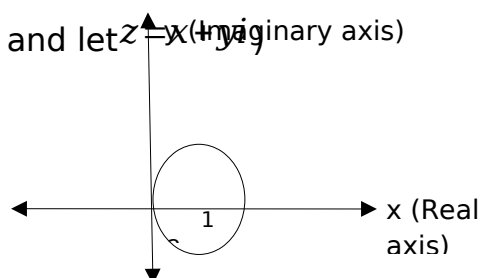
D. $\left\{ 0, \pm \frac{1}{\sqrt{2}}(1+i) \right\}$

19. The figure on the right best describes which of the following expression on a complex plane? (That is a unit circle centre at $(1,0)$ and let $z = x + iy$ where x and y are real and imaginary axis)

A. $|z-1|=1$

B. $|z|+1=-1$

C. $|z|-1=1$



D. $|z+1|=1$

20. What are the value of s & t that satisfy the equation: $\frac{s+3i}{4-2i} = \frac{2+ti}{20}$?

A. $s=2, t=3$

C. $s=2, t=16$

B. $s=-6, t=10$

D. $s=-4, t=6$

21. Which of the following is equal to $[4(\cos 20^\circ + i \sin 20^\circ)][3(\cos 25^\circ + i \sin 25^\circ)]$?

A. $6\sqrt{2}(1-i)$

C. $3\sqrt{2}(1-i)$

B. $3\sqrt{2}(1+i)$

D. $6\sqrt{2}(1+i)$

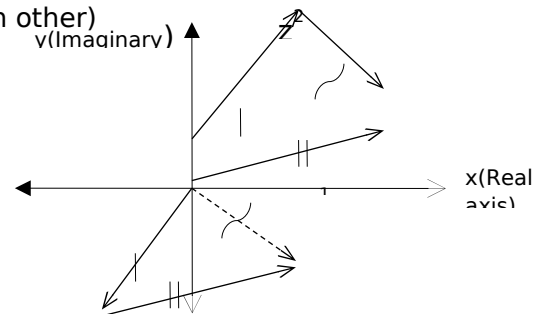
22. On the complex plane to the right, assume z_1 & z_2 stands for complex number then the broken (---) segment represent which one of the following number? (Segments having same marks are parallel & congruent to each other)

A. $z_1 + z_2$

B. $z_1 - z_2$

C. $z_2 - z_1$

D. $2(z_1 + z_2)$



23. Once we perform the indicated operations, the expression $\frac{6\sqrt{3}(\cos 40^\circ + i \sin 40^\circ)}{3(\cos 190^\circ + i \sin 190^\circ)}$ is equal to:

A. $3+\sqrt{3}i$

B. $3-\sqrt{3}i$

C. $-3+\sqrt{3}i$

D. $-3-\sqrt{3}i$

24. If $w = \frac{16i}{1+i} + (1-3i)^2$ and $z = |w| + \bar{w}$, then the simplest form of z is:

A. $\sqrt{2}+2i$

B. $2+2i$

C. $4-2i$

D. $2-2i$

25. The polar form of a complex number $z = -\sqrt{3} - i$ is:

A. $z = 2\left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}\right)$

C. $z = 2\left(\cos \frac{7\pi}{6} + i \sin \frac{7\pi}{6}\right)$

B. $z=2\left(\cos\frac{11\pi}{6}+i\sin\frac{11\pi}{6}\right)$

D. $z=2\left(\cos\frac{5\pi}{6}+i\sin\frac{5\pi}{6}\right)$

26. The simplest form of the expression $\left(\frac{1-i}{\sqrt{2}}\right)^{40}$ is:

A. $1-i$

B. 1

C. $1+i$

D. -1

27. What is the principal argument of $z=(5+5i)^{11}$?

A. $\frac{\pi}{3}$

B. $\frac{2\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{3\pi}{3}$

28. If $z_1=\frac{2-i}{1+i}$ ^ $z_2=\frac{1+i}{1-i}$ then what is the value of $(z_1+2z_2)=$ _____

B. $1+i$

B. $\frac{1+i}{2}$

C. $\frac{1-i}{2}$

D. $1-i$

29. Simplify the expression below as much as possible and give your answer in the form $x+yi$.

$$|3+4i|+\frac{25i}{3+4i}$$

30. Write the complex number $z=-\sqrt{3}i$ in polar form.

31. Under the set of complex numbers, what will be the solution set of the equation $x^2-2x+5=0$?

A. $\{\}$

B. $[2+i, 2-i]$

C. $[1+2i, 1-2i]$

D. $[2+4i, 2-4i]$

32. The polar form of the complex number $z=1-\sqrt{3}i$ is:

A. $2\left(\cos\frac{5\pi}{3}+i\sin\frac{5\pi}{3}\right)$

C. $2\left(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6}\right)$

B. $2\left(\cos\frac{\pi}{6}-i\sin\frac{\pi}{6}\right)$

D. $2\left(\cos\frac{5\pi}{3}-i\sin\frac{5\pi}{3}\right)$

33. The value of x so that $\begin{vmatrix} x & x+4 \\ 1 & 1 \end{vmatrix} = 0$

34. For what value of x and y a matrix $A = \begin{vmatrix} 0 & x & 1 \\ 1 & -2 & 3 \\ 1 & 0 & 0 \end{vmatrix}$ is invertible

35. let A and B be 3*3 matrices such that $A = \begin{vmatrix} 2 & 0 & 0 \\ 0 & 1 & 5 \\ 0 & 0 & 0 \end{vmatrix}$ and $|B| = \frac{1}{10}$ then what is the value of $|AB^T|$?

36. If $A = \begin{vmatrix} \alpha & 2 & \beta \\ 2 & 1 & 3 \end{vmatrix}$ and determinant of coefficient matrix is -5 then what is the value of x?

37. Consider the matrix below then find the required minors and co-factors.

$A = \begin{vmatrix} -1 & 4 & 7 \\ 3 & 0 & -2 \end{vmatrix}$

a. M_{23} b. M_{32} c. C_{23} d. C_{32}

38. The system of equation $\begin{cases} x+y+z=6 \\ x-2y=-4 \end{cases}$ has no solution then what will be the value of a and b?

A. $a=2$ & $b=16$

B. $a=-2$ & $b=16$

39. Given matrix $A = \begin{vmatrix} 2 & -1 \end{vmatrix}$ then what will be matrix B such that $BA = B + A$?

40. If $A = \begin{pmatrix} 2 & 7 \\ 7 & 2 \end{pmatrix}$ then $(AB)^{-1} = \underline{\hspace{2cm}}$.

41. Solve $\frac{2-i}{x-yi} = 1 + \sqrt{-4}$ then $x = \underline{\hspace{1cm}}$ & $y = \underline{\hspace{1cm}}$

42. Show that the simplified form of $i^{16} - i^{20} + i^{25}$ is i.

43. Show that $\overline{\left(\frac{3-4i}{1-2i}\right)} = \sqrt{5}$

44. For a complex number z , solve the equation $z^3 + 8 = 0$

45. Show that $|z + 2yi| = 4$ determine the geometric horizontal ellipse centre at the origin.
Assume that $z = x + yi$

46. Which of the following is the simplest form of $\frac{4-3i}{3+4i} + \overline{1-2i}$?

47. The solution set of the equation $x^2 - 2x + 5 = 0$

48. Polar form of the complex number $z = \left(\frac{2}{1+\sqrt{3}i}\right)^2$ is:

A. $z = \cos 120^\circ + i \sin 120^\circ$

C. $z = \cos 60^\circ + i \sin 60^\circ$

B. $z = \cos 240^\circ + i \sin 240^\circ$

D. $z = -\cos 120^\circ + i \sin 120^\circ$

49. If $(2x - yi)(3 + i) = 20i$ then find the value of x and y .

50. The simplified form of $\frac{(1-3i)(5+i)}{1+i}$ is:

51. The simplest form of $\frac{2(\cos 16^\circ + i \sin 16^\circ)}{3(\cos 44^\circ + i \sin 44^\circ) \cdot 2(\cos 62^\circ + i \sin 62^\circ)}$ is:

A. $2i$

B. $-2i$

52. Find the Cartesian coordinates of the point having the given polar coordinate.

a. $\left(2, \frac{3\pi}{2}\right)$

b. $\left(3, \frac{-5\pi}{6}\right)$

53. Write each of the following complex numbers in polar form.

a. $z = 6\sqrt{3} + 6i$

b. $z = -2i$

54. Given two matrices A & B of different border, to multiply A and B that is to determine AB:

A. number of rows of A should be equal to number of columns of B

B. number of columns of A should be equal to number of rows of A.

C. both must be square matrices

55. Given a system of equations $AX=B$, where A is the coefficient matrix, X is column variable matrix and B the constant column matrix. If the determinant of the coefficient matrix is zero implies that:

- A. the system has many solutions
- B. the system has no solutions
- C. the system has one solution
- D. A & B

56. Let $W = \frac{8i}{1+i} + \frac{(1-3i)^2}{2}$, then $|W|$ is equal to

- A. 1
- B. 2
- C. $\sqrt{2}$
- D. $\frac{1}{2}$

57. If $Z=x+yi$ is a complex number, then $2|Z|^2+(Z-\bar{Z})^2=2$ is equivalent to which one of the following equations?

- A. $x^2-y^2=2$
- B. $2x^2-y^2=1$
- C. $x^2-y^2=1$
- D. $x^2-3iy^2=1$

58. What is the principal argument of $(-3 - 3i)^{13}$?

- A. $\frac{\pi}{2}$
- B. $\frac{2\pi}{3}$
- C. $\frac{\pi}{4}$
- D. $\frac{3\pi}{4}$

59. Which of the following is False?

- A. $\begin{vmatrix} 4-2 \\ 1-3 \end{vmatrix} = -10$
- B. $\begin{vmatrix} 2-10 \\ 03-2 \\ 101 \end{vmatrix} = 8$
- C. the inverse of $\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}$ is $\begin{pmatrix} 2 & -5 \\ -1 & 3 \end{pmatrix}$
- D. the inverse of $\begin{pmatrix} 2 & -3 \\ 4 & -7 \end{pmatrix}$ is $\begin{pmatrix} -3.5 & 11.5 \\ 2 & -1 \end{pmatrix}$

60. What is the solution set of the system

- A. $\emptyset$
- B. $\{(0, 2, 1)\}$
- C. $\begin{cases} 2x+3y-4z=2 \\ x+2y-3z=1 \\ z+y-z=1 \end{cases}$
- D. $\{(2k + 1, k, k)/k \in \mathbb{R}\}$
- E. $\{(1 - k, 2k, k)/k \in \mathbb{R}\}$

