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Department of Mathematics, 2020-2021
Subject: Applied Mathematics

CLASS: XII | Worksheet- Matrices and Determinants | 18-04-2021

Q.1.	$If\ A = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix}, then\ A\ is\ a$						
	A	Diagonal matrix	**B**	scalar matrix	**C**	Square matrix	**D**	zero matrix
Q.2.	$If\ A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 5 & 6 \end{bmatrix}\ and\ B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$ then						
	A	Only AB is defined	**B**	Only BA is defined	**C**	AB and BA are both defined	**D**	AB and BA both are not defined.
Q.3.	$If\ A = \begin{bmatrix} 1 & 0 \\ 1 & 2 \end{bmatrix}, then\ A^2$						
	A	$\begin{bmatrix} 1 & 0 \\ 1 & 4 \end{bmatrix}$	**B**	$\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$	C	$\begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix}$	**D**	$\begin{bmatrix} 1 & 0 \\ 3 & 4 \end{bmatrix}$
Q.4.	$If\ A = \begin{bmatrix} 3 & 4 \\ -1 & 2 \end{bmatrix}, then\ adjA =$						
	A	$\begin{bmatrix} 2 & -4 \\ 1 & 3 \end{bmatrix}$	**B**	$\begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$	**C**	$\begin{bmatrix} -3 & -4 \\ 1 & -2 \end{bmatrix}$	**D**	$\begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$
Q.5.	$If\ A = \begin{bmatrix} 4 & 0 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}, then\ \lvert A.adjA \rvert$						
	A	8	**B**	64	**C**	512	**D**	1
Q.6.	If A is a square matrix and $A^2 = A, then\ (I - A)^3 + A =$						
	A	I	**B**	A	**C**	I − A	**D**	I+A
Q.7.	The number of possible matrices of order 3x3 with each entry 0 or 1 is						
	A	18	**B**	81	**C**	27	**D**	512
Q.8.	$If\ \begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & 5 \\ 8 & 3 \end{vmatrix}, then\ x =$						
	A	3	**B**	-3	**C**	± 3	**D**	± 9

Q.9. $If \begin{pmatrix} 2x+y & 4x \\ 5x-7 & 4x \end{pmatrix} = \begin{pmatrix} 7 & 7y-13 \\ y & x+6 \end{pmatrix}, then\ value\ of\ x\ and\ y$

A	x= 3, y= 1	**B**	x=2, y= 3	**C**	x= 2, y= 4	**D**	x=3, y= 3

Q10. If A= $\begin{pmatrix} k & 1 & 0 \\ 5 & k & 3 \\ 6 & -2 & 0 \end{pmatrix}$ is a singular matrix k =

A	3	**B**	-3	**C**	0	**D**	6

Q11. If A= $\begin{pmatrix} 0 & a & b \\ -2 & 0 & c \\ -3 & 4 & 0 \end{pmatrix}$ $is\ a\ skew\ symmetric\ matrix, find\ the\ value\ of\ a\ , b\ and\ c.$

Q12. Using properties of determinants, evaluate: $\begin{pmatrix} 2 & 11 & 57 \\ 3 & 13 & 68 \\ 4 & 15 & 79 \end{pmatrix}$

Q13. $Given: A = \begin{pmatrix} 5 & 3 \\ -1 & -2 \end{pmatrix}$ $satisfied\ the\ equation\ A^2 - 3A - 7I = O$. Using this equation find A^{-1}

Q14. Using determinants find the equation of line passing through (1, 6) and (-2, -9).

Q15. Construct a $2x2\ matrix$ whose elements are given by $a_{ij} = (i+2j)^2$

Q16. Using properties of determinants, solve for x, if $\begin{vmatrix} 4-x & 4+x & 4+x \\ 4+x & 4-x & 4+x \\ 4+x & 4+x & 4-x \end{vmatrix} = 0$

Q17. Express the matrix as the sum of a symmetric and a skew symmetric matrix where,

$$A = \begin{pmatrix} 2 & 4 & -6 \\ 7 & 3 & 3 \\ 1 & -2 & 4 \end{pmatrix}$$

Q18. If X and Y are $2x2$ matrices then solve the following for X and Y:

$$X + Y = \begin{pmatrix} 4 & -2 \\ 7 & 6 \end{pmatrix}, X - Y = \begin{pmatrix} 6 & 2 \\ 3 & -4 \end{pmatrix}$$

Q19. $If\ (x \quad -5 \quad -1)\begin{pmatrix} 2 & 4 & -6 \\ 7 & 3 & 3 \\ 1 & -2 & 4 \end{pmatrix}\begin{pmatrix} x \\ 4 \\ 1 \end{pmatrix} = \mathbf{0}$ then find x.

Q20. For the two-sector economy input- output table is given below. Find the technology matrix.

$Output \rightarrow$ $Input \downarrow$	Industry 1	Industry 2	Final Demand	Total output
Industry 1	16	20	4	40
Industry 2	8	40	32	80

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ANSWER							
1.	B	**2.**	C	**3.**	D	**4.**	A
5.	C	**6.**	A	**7.**	D	**8.**	D
9.	B	**10**	A	**11.**	a= 2, b= 3, c= -4	12	0
13	$\frac{1}{7}\begin{pmatrix} 2 & 3 \\ -1 & -5 \end{pmatrix}$	**14**	5x-y+1=0	**15**	$\begin{pmatrix} 9 & 16 \\ 25 & 36 \end{pmatrix}$	16	$x = 0, -12$
17	$\begin{pmatrix} 2 & \frac{11}{2} & -\frac{5}{2} \\ \frac{11}{2} & 3 & \frac{3}{2} \\ -\frac{5}{2} & \frac{3}{2} & 4 \end{pmatrix}+\begin{pmatrix} 0 & \frac{-3}{2} & -\frac{7}{2} \\ \frac{3}{2} & 0 & \frac{7}{2} \\ \frac{7}{2} & -\frac{7}{2} & 0 \end{pmatrix}$	**18**	$X = \begin{pmatrix} 5 & 0 \\ 5 & 1 \end{pmatrix}$, $Y = \begin{pmatrix} -1 & -2 \\ 2 & 5 \end{pmatrix}$	19	$\pm 4\sqrt{3}$	20.	$\begin{pmatrix} \frac{2}{5} & \frac{1}{4} \\ \frac{1}{5} & \frac{1}{2} \end{pmatrix}$

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