MATHS

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MATRICES AND DETERMINANTS

Worked Example

1. Suppose that matrix has 8 elements.What are the possible orders it can have?What if it has 11 elements?

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2. $Construct~(3 \times 2)$ type matrix if $a_{ij} = 2i - 3j(1 \le i \le 3, 1 \le j \le 2)$

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3. Solve a,b,c,d if

$$\begin{bmatrix} a+2b & 3a-b & 4 \\ 2c+d & 3 & 3c-d \end{bmatrix} = \begin{bmatrix} 3 & 2 & 4 \\ 7 & 3 & 3 \end{bmatrix}$$

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4. If A= $\begin{bmatrix} 3 & -1 & 0 \\ 2 & 1 & 5 \end{bmatrix}$,B= $\begin{bmatrix} 2 & 2 & 1 \\ 3 & 0 & -2 \end{bmatrix}$ .Find A+B,2A-B

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5. If A= $\begin{bmatrix} 2 & 1 \\ 4 & -2 \end{bmatrix}$,B= $\begin{bmatrix} 4 & -2 \\ 1 & 4 \end{bmatrix}$ and C= $\begin{bmatrix} -2 & -3 \\ 1 & 2 \end{bmatrix}$ find

(i)-2A+B+C

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6. If A= $\begin{bmatrix} 2 & 1 \\ 4 & -2 \end{bmatrix}$,B= $\begin{bmatrix} 4 & -2 \\ 1 & 4 \end{bmatrix}$ and C= $\begin{bmatrix} -2 & -3 \\ 1 & 2 \end{bmatrix}$ find

(II)A+(B+C)

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7. If A=$\begin{bmatrix} 2 & 1 \\ 4 & -2 \end{bmatrix}$,B=$\begin{bmatrix} 4 & -2 \\ 1 & 4 \end{bmatrix}$ and C=$\begin{bmatrix} -2 & -3 \\ 1 & 2 \end{bmatrix}$ find

(III)A-(3B-C)

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8. If X=$\begin{bmatrix} 2 & 3 & 0 \\ 1 & -1 & 5 \end{bmatrix}$,Y=$\begin{bmatrix} -1 & -2 & 3 \\ -1 & 0 & 2 \end{bmatrix}$,Z=$\begin{bmatrix} 0 & 4 & -1 \\ 5 & 6 & -5 \end{bmatrix}$ find 3X+4Y-Z

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9. Simplify:$5\begin{bmatrix} 3 & 2 \\ 2 & 1 \end{bmatrix} - 2\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$

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10. If A=$\begin{bmatrix} 2 & 3 & 1 \\ 1 & 0 & 2 \\ 2 & 1 & 0 \end{bmatrix}$ compute A^2.

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11. Solve: $\begin{bmatrix} x & 1 & 2 \end{bmatrix} \begin{bmatrix} 1 & 0 & 1 \\ -1 & 1 & 1 \\ 2 & 1 & 2 \end{bmatrix} \begin{bmatrix} -1 \\ 1 \\ 2 \end{bmatrix} = 0$

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12. If A= $\begin{bmatrix} 3 & 2 & 1 \\ 1 & 1 & 0 \\ 2 & 1 & -1 \end{bmatrix}$ and B= $\begin{bmatrix} 1 & 0 \\ -1 & 1 \\ 2 & 1 \end{bmatrix}$ compute AB and BA if exists

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13. Packet I consists of 3 pens, 2 pencils and I note book, Packet II consists of 2 pens, 3 pencils for and 1 notebook, Packet III consists of I pen, 4pencils and 2 notebooks packet .If a pen costs of Rs10 , a pencil costs Rs 5 and a notebook costs Rs 20. Using matrices find the cost of packet II?

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14. If A= $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 2 & 0 \\ 2 & 1 & -1 \end{bmatrix}$,B= $\begin{bmatrix} 1 & 1 & 0 \\ 2 & 2 & 1 \\ 1 & 0 & -1 \end{bmatrix}$ Verify the following

(i)$(A+B)^T = A^T + B^T$

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15. If A= $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 2 & 0 \\ 2 & 1 & -1 \end{bmatrix}$,B= $\begin{bmatrix} 1 & 1 & 0 \\ 2 & 2 & 1 \\ 1 & 0 & -1 \end{bmatrix}$ Verify the following

(iI)$(A-B)^T = A^T - B^T$

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16. If A= $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 2 & 0 \\ 2 & 1 & -1 \end{bmatrix}$,B= $\begin{bmatrix} 1 & 1 & 0 \\ 2 & 2 & 1 \\ 1 & 0 & -1 \end{bmatrix}$ Verify the following

(III)$(3A)^T = 3A^T$

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17. If A= $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 2 & 0 \\ 2 & 1 & -1 \end{bmatrix}$,B= $\begin{bmatrix} 1 & 1 & 0 \\ 2 & 2 & 1 \\ 1 & 0 & -1 \end{bmatrix}$ Verify the following

(IV) $(AB)^T = B^T A^T$

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18. Express the matrix $\begin{bmatrix} 7 & 1 & 5 \\ -4 & 0 & 3 \\ -2 & 6 & 1 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrices.

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19. Evaluate:

(i) $\begin{vmatrix} 3 & -2 \\ 4 & 2 \end{vmatrix}$

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20. Evaluate:

(ii) $\begin{vmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{vmatrix}$

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21. Compute all minors,cofactors of A hence compute A ia A= $\begin{vmatrix} 2 & 1 & 2 \\ 1 & 1 & 0 \\ 2 & 1 & -1 \end{vmatrix}$

.Hence find|A| by expanding along any row or column

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22. Find |A| if A=

$[(0, \cos\theta_1, \sin\theta_1), (\cos\theta_1, 0, \sin\theta_2), (\sin\theta_1, -\sin\theta_2, 0)]$

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23. Using sarrus rule find|A| if A= $\begin{bmatrix} 3 & 2 & 1 \\ 1 & 2 & 2 \\ 2 & 1 & -1 \end{bmatrix}$

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24. Prove that $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$

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25. Evaluate $\begin{vmatrix} 1475 & 2110 & 3585 \\ 2115 & 1212 & 3327 \\ 4200 & 2525 & 6725 \end{vmatrix}$

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26. Show that $\begin{vmatrix} (a+b)^2 & (a-b)^2 & ab \\ (b+c)^2 & (b-c)^2 & bc \\ (c+a)^2 & (c-a)^2 & ca \end{vmatrix}$

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27. Solve$|((x+1),0,0)),((2x+1),(x-1),0)),\begin{pmatrix}3x+1\\2x-1\\x-2\end{pmatrix}|$=0`

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28. Show that $\begin{vmatrix}x+y & y+z & z+x\\ y+z & z+x & x+y\\ z+x & x+y & y+z\end{vmatrix} = 2\left[3xyz - x^3 - y^3 - z^3\right]$

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29. Prove that

$$\begin{vmatrix}1 & x & x^3\\ 1 & y & y^3\\ 1 & z & z^3\end{vmatrix} = (x-y)(y-z)(z-x)(x+y+z)$$

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30. Factorize: $\begin{vmatrix} p & p^2 & qr \\ q & q^2 & rp \\ r & r^2 & pq \end{vmatrix}$

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31. Solve $\begin{vmatrix} a-x & a+x & a+x \\ a+x & a-x & a+x \\ a+x & a+x & a-x \end{vmatrix} = 0$.Using factor theorem

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32. Solve that $\begin{vmatrix} y+z & x & x^2 \\ z+x & y & y^2 \\ x+y & z & z^2 \end{vmatrix} = (x+y+z)(x-y)(y-z)(z-x)$

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33. Sove that

$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}^2 = \begin{vmatrix} 1+a^2+a^4 & 1+ab+a^2b^2 & 1+ac+a^2c^2 \\ 1+ab+a^2b^2 & 1+b^2+b^4 & 1+bc+b^2c^2 \\ 1+ac+a^2c^2 & 1+ba+b^2c^2 & 1+c^2+c^4 \end{vmatrix}$ and hence show RHS determinent is $= (a-b)^2(b-c)^2(c-a)^2$

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34. Prove that $\begin{vmatrix} a & b \\ c & d \end{vmatrix}^2 = \begin{vmatrix} a^2+c^2 & ab+cd \\ ab+cd & b^2+d^2 \end{vmatrix}$

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35. Show that

$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2 = |\left(c^2-a^2-b^2, (ac-ab-bc), (bc-ab-ca), \left(ac-ab-\right.\right.$

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36. Show that $\begin{vmatrix} 0 & a & c \\ a & 0 & b \\ c & b & 0 \end{vmatrix}^2 = \begin{vmatrix} 2ac & ab & bc \\ ab & -a^2 & -ac+b^2 \\ bc & -ac+b^2 & -c^2 \end{vmatrix}$

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37. If A_i, B_i, C_i are the cofactors of a_i, b_i, c_i respectively,i=1,2,3 in $\Delta = \begin{vmatrix} a_1 & b_2 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ show that $\begin{vmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{vmatrix} = \Delta^0$

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38. Find the area of the triangle with vertices are(3,5)(2,4)(5,1).

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39. If the points (4,5)(6,7)and(2,m)are collinear find value of m.

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40. Show that $(a^2 + b^2, c^2)$, $(b^2 + c^2, a^2)$,and$(c^2 + a^2, b^2)$are collinear

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Solution To Exercise 7 1

1. Construct an $m \times n$ matrix A = $[a_{ij}]$, where a_{ij} is given by

$$a_{ij} = \frac{(i - 2j)^2}{2}$$ with m = 2, n = 3

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2. Construct an $m \times n$ matrix A = $[a_{ij}]$, where a_{ij} is given by

$$a_{ij} = \frac{|(3i - 4j)|}{4}$$ with m = 3, n = 4

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3. Find the values of p,q,r, and s if

$$\begin{bmatrix} p^2 - 1 & 0 & -31 - q^3 \\ 7 & r + 1 & 9 \\ -2 & 8 & s - 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & -4 \\ 7 & \frac{3}{2} & 9 \\ -2 & 8 & -\pi \end{bmatrix}$$

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4. Determine the value of x+y if $\begin{bmatrix} 2x+y & 4x \\ 5x-7 & 4x \end{bmatrix} = \begin{bmatrix} 7 & 7y-13 \\ y & x+6 \end{bmatrix}$

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5. Determine the matrices A and B if they satisfy 2 A

$-B + \begin{bmatrix} 6 & -6 & 0 \\ -4 & 2 & 1 \end{bmatrix} = 0 \text{ and } A - 2B = \begin{bmatrix} 3 & 2 & 8 \\ -2 & 1 & -7 \end{bmatrix}$

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6. If A = $\begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix}$, then compute A^4.

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7. Consider the matrix $A_\alpha = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

Show that $A_\alpha A_\beta = A_{\alpha+\beta}$

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8. Consider the matrix $A_\alpha = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

Find all possible real values of α satisfying the condition $A_\alpha + A_\alpha{}^T = I.$

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9. If A = $\begin{bmatrix} 4 & 2 \\ -1 & x \end{bmatrix}$ and such that (A-2I) (A-3I) = 0, find the value of x.

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10. If A = $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$, show that A^2 is a unit matrix.

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11. If A = $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ and $A^3 - 6A^2 + 7A + kI = 0$, find the value of k.

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12. Given your own examples of matrices satisfying the conditions in each case:

A and B such that AB $\neq$ BA.

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13. Given your own examples of matrices satisfying the conditions in each case:

A and B such that AB =0 and BA $\neq$ 0.

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14. Given your own examples of matrices satisfying the conditions in each case:

A and B such that AB =0 and BA $\neq$ 0.

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15. Show that f (x) f (y) = f(x+y) , where

$$f(x) = \begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

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16. If A is a square matrix such that A^2 = A, find the value of $7A - (I + A)^3$.

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17. Verify the property A(B+C) = AB+AC, when the matrices A,B, and C are given by

$$A = \begin{bmatrix} 2 & 0 & -3 \\ 1 & 4 & 5 \end{bmatrix}, B = \begin{bmatrix} 3 & 1 \\ -1 & 0 \\ 4 & 2 \end{bmatrix}, \text{ and } C = \begin{bmatrix} 4 & 7 \\ 2 & 1 \\ 1 & -1 \end{bmatrix}.$$

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18. Find the matrix A which satisfies the matrix relation A $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$.

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19. If $A^T = \begin{bmatrix} 4 & 5 \\ -1 & 0 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 1 \\ 7 & 5 & -2 \end{bmatrix}$, verify the $(A+B)^T = A^T + B^T = B^T + A^T$

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20. If $A^T = \begin{bmatrix} 4 & 5 \\ -1 & 0 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 1 \\ 7 & 5 & -2 \end{bmatrix}$, verify the $(A-B)^T = A^T - B^T$

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21. If $A^T = \begin{bmatrix} 4 & 5 \\ -1 & 0 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 1 \\ 7 & 5 & -2 \end{bmatrix}$, verify the $(B^T)^T = B$.

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22. If A is a 3×4 matrix and B is a matrix such that both A^TB and BA^T are defined, what is the order of the matrix B?

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23. Express the matrices as the sum of a symmetric matrix and a skew - symmetric matrix:

$$\begin{bmatrix} 4 & -2 \\ 3 & -5 \end{bmatrix}$$

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24. Express the matrices as the sum of a symmetric matrix and a skew - symmetric matrix:

$$\begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}.$$

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25. Find the matrix A such that $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 & 10 \\ 1 & 2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$.

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26. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ x & 2 & y \end{bmatrix}$ is a matrix such that $\mathrm{AA}^T = 9I$, find the values of x and y.

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27. For what value of x, the matrix $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & x^3 \\ 2 & -3 & 0 \end{bmatrix}$ is skew-symmetric .

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28. If $\begin{bmatrix} 0 & p & 3 \\ 2 & q^2 & -1 \\ r & 1 & 0 \end{bmatrix}$ is skew- symmetric, find the values of p,q, and r.

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29. Construct the matrix A = $\left[a_{ij}\right]_{3 \times 3}$, where $a_{ij} = i - j$. State whether A is symmetric or skew- symmetric.

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30. Let A and B be two symmetric matrices. Prove that AB= BA if and only if AB is a symmetric matrix.

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31. If A and B are symmetric matrices of same order, prove that AB+BA is a symmetric matrix.

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32. If A and B are symmetric matrices of same order, prove that AB-BA is a skew -symmetric matrix.

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33. A shopkeeper in a Nuts and Spices shop makes gift packs of cashew Nuts, raisins and almonds.

Pack-I coin 100 gm of cashew nuts ,100gm of raisins and 50 gm of almonds.

Pack-II contains 200 gm of cashew nuts, 100 gm of raisins and 100 gm of almonds.

Pack-III contains 250 gm of cashew nuts, 250 gm of raisins and 150 gm of almonds.

The cost of 50 gm of cashew nuts is Rs 50/-, 50 gm of raisins is Rs 10/-, and 50 gm of almonds is Rs60/-, What is the cost of each gift pack?

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Solution To Exercise 7 2

1. Without expanding the determinant , prove that

$$\begin{vmatrix} s & a^2 & b^2+c^2 \\ s & b^2 & c^2+a^2 \\ s & c^2 & a^2+b^2 \end{vmatrix} = 0$$

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2. Show that $\begin{vmatrix} b+c & bc & b^2c^2 \\ c+a & ca & c^2a^2 \\ a+b & ab & a^2b^2 \end{vmatrix} = 0.$

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3. Prove that $\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2.$

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4. Prove that

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right).$$

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5. Prove that $\begin{vmatrix} \sec^2\theta & \tan^2\theta & 1 \\ \tan^2\theta & \sec^2\theta & -1 \\ 38 & 38 & 2 \end{vmatrix} = 0.$

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6. Show that $\begin{vmatrix} x+2a & y+2b & z+2c \\ x & y & z \\ a & b & c \end{vmatrix} = 0.$

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7. Write the general form of a 3×3 skew -symmetric matrix and prove that its determinant is 0.

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8. If $\begin{vmatrix} a & b & a\alpha + b \\ b & c & b\alpha + c \\ a\alpha + b & b\alpha + c & 0 \end{vmatrix} = 0,$ prove that a,b,c, are in G.P. or α is a root of $ax^2 +$ 2bx+c=0

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9. Prove that $\begin{vmatrix} 1 & a & a^2 - bc \\ 1 & b & b^2 - ca \\ 1 & c & c^2 - ab \end{vmatrix} = 0.$

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10. If a,b,c are p^{pt}, q^{th} and r^{th} terms of an A.P., find the value of $\begin{vmatrix} a & b & c \\ p & q & r \\ 1 & 1 & 1 \end{vmatrix}$.

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11. Show that $\begin{vmatrix} a^2+x^2 & ab & ac \\ ab & b^2+x^2 & bc \\ ac & bc & c^2+x^2 \end{vmatrix}$ is divisible byx^4

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12. Find the value of $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix}$ if x,y,z $\neq 1$

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13. If A=$\begin{bmatrix} \frac{1}{2} & \alpha \\ 0 & \frac{1}{2} \end{bmatrix}$ prove that $\sum^{n} \_ (k=1) = \frac{1}{3}\left(1-\frac{1}{4^n}\right)$

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14. Without expanding, evaluate the determinants :

$$\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$$

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15. Without expanding evaluate the folleing determinents

(ii) $\begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{vmatrix}$

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16. If A is a square matrix and |A|=2, find the value of $|\mathrm{AA}|^T$.

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17. If A and B are square matrices of order 3 such that |A| = -1 and |B| = 3, find the value of |3AB|.

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18. If $\lambda =$ -2, determine the value of $\begin{vmatrix} 0 & 2\lambda & 1 \\ \lambda^2 & 0 & 3\lambda^2+1 \\ -1 & 6\lambda-1 & 0 \end{vmatrix}$.

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19. Determine the roots of the equation $\begin{vmatrix} 1 & 4 & 20 \\ 1 & -2 & 5 \\ 1 & 2x & 5x^2 \end{vmatrix} = 0.$

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20. Verify that det (AB) = (det A) (det B) for

$A = \begin{bmatrix} 4 & 3 & -2 \\ 1 & 0 & 7 \\ 2 & 3 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 & 3 \\ -2 & 4 & 0 \\ 9 & 7 & 5 \end{bmatrix}$.

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21. Using cofactors of elements of second row, evaluate |A|, where A =
$$\begin{bmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{bmatrix}$$

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Solution To Exercise 7 3

1. Show that $\begin{vmatrix} x & a & a \\ a & x & a \\ a & a & x \end{vmatrix} = (x+2a)(x-a)^2$

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2. Show that $\begin{vmatrix} b+c & a-c & a-b \\ b-c & c+a & b-a \\ c-b & c-a & a+b \end{vmatrix} = 8abc$

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3. Solve $\begin{vmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{vmatrix} = 0$

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4. Show that $\begin{vmatrix} b+c & a & a^2 \\ c+a & b & b^2 \\ a+b & c & c^2 \end{vmatrix} = (a+b+c)(a-b)(b-c)(c-a)$

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5. Solve $\begin{vmatrix} 4-x & 4+x & 4+x \\ 4+x & 4-x & 4+x \\ 4+x & 4+x & 4-x \end{vmatrix} = 0$

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6. Show that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$

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Solution To Exercise 7 4

1. Find the area of the triangle whose vertices are (0,0), (1,2) and (4,3).

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2. If (k,2),(2,4) and (3,2) are vertices of the triangle of area 4 square units then determine the value of k.

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3. Identify the singular and non-singular matrices:

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

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4. Identify the singular and non-singular matrices:

$$\begin{bmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{bmatrix}$$

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5. Identify the singular and non-singular matrices:

$$\begin{bmatrix} 0 & a-b & k \\ b-a & 0 & 5 \\ -k & -5 & 0 \end{bmatrix}$$

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6. Determine the values of a and b so that the following matrices are singular:

A = $\begin{bmatrix} 7 & 3 \\ -2 & a \end{bmatrix}$

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7. Determine the values of a and b so that the following matrices are singular:

$$B = \begin{bmatrix} b-1 & 2 & 3 \\ 3 & 1 & 2 \\ 1 & -2 & 4 \end{bmatrix}$$

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8. If $\cos 2\theta = 0$,determine$\begin{vmatrix} 0 & \cos\theta & \sin\theta \\ \cos\theta & \sin\theta & 0 \\ \sin\theta & 0 & \cos\theta \end{vmatrix}^2$

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9. Find the value of the product:$\begin{vmatrix} \log_3 64 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix} \times \begin{vmatrix} \log_2 3 & \log_8 3 \\ \log_3 4 & \log_3 4 \end{vmatrix}$

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Solution To Exercise 7 5

1. If $a_{ij} = \frac{1}{2}(3i - 2j)$ and $A = [a_{ij}]_{2 \times 2}$ is

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

B. $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} \\ 2 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 2 \\ \frac{1}{2} & -\frac{1}{2} \end{bmatrix}$

D. $\begin{bmatrix} -\frac{1}{2} & \frac{1}{2} \\ 1 & 2 \end{bmatrix}$

Answer: B

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2. What must be the matrix X, if 2X+ $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 8 \\ 7 & 2 \end{bmatrix}$?

A. $\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -3 \\ 2 & -1 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 6 \\ 4 & -2 \end{bmatrix}$

D. $\begin{bmatrix} 2 & -6 \\ 4 & -2 \end{bmatrix}$

Answer: A

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3. Which of the following is not true about the matrix $\begin{vmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 5 \end{vmatrix}$?

A. a scalar matrix

B. a diagonal matrix

C. an upper triangular matrix

D. a lower triangular matrix

Answer: B

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4. If A and B are two matrices such that A+B and AB are both defined, then:

A. A and B are two matrices not necessarily of order same

B. A and B are square matrices of same order

C. Number of column of A is equal to the number of rows of B

D. A=B

Answer: B

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5. If A = $\begin{bmatrix} \lambda & 1 \\ -1 & -\lambda \end{bmatrix}$, then for what value of λ, $A^2 = 0$?

A. 0

B. ± 1

C. -1

D. 1

Answer: B

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6. If A= $\begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ and B = $\begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$, then the values of a and b are

A. a=4,b=1

B. a=1,b=4

C. a=0,b=4

D. a=2,b=4

Answer: B

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7. If A = $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is a matrix satisfying the equation $\mathrm{AA}^T = 9I$, where $Iis3 \times 3$ identity matrix, then the ordered pair (a,b) is equal to

A. (2,-1)

B. (-2,1)

C. (2,1)

D. (-2,-1)

Answer: D

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8. If A is a square matrix, then which of the following is not symmetric ?

A. A+A

B. $\forall^T$

C. $A^T A$

D. $A - A^T$

Answer: D

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9. If A and B are symmetric matrices of order n,where$(A \neq B)$,then:

A. A+B is skew -symmetric

B. A+B is symmetric

C. A+B is diagonal matrix

D. A+B is zero matrix

Answer: B

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10. If A = $\begin{bmatrix} a & x \\ y & a \end{bmatrix}$ and if xy = 1, then det $\left(\mathrm{AA}^T\right)$ is equal to

A. $(a-1)^2$

B. $\left(a^2+1\right)^2$

C. a^2-1

D. $\left(a^2-1\right)^2$

Answer: D

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11. The value of x, for which the matrix A = $\begin{bmatrix} e^{x-2} & e^{7+x} \\ e^{2+x} & e^{2x+3} \end{bmatrix}$ is singular is

A. 9

B. 8

C. 7

D. 6

Answer: B

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12. If the points (x,-2), (5,2), (8,8) are collinear, then x is equal to

A. -3

B. $\frac{1}{3}$

C. 1

D. 3

Answer: D

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13. If $= \begin{vmatrix} 2a & x_1 & y_1 \\ 2b & x_2 & y_2 \\ 2c & x_3 & y_3 \end{vmatrix} = ab\frac{c}{2} \neq 0$then the area area of the triangle whose vertices are $\left(\frac{x_1}{a}, \frac{y_1}{a}\right), \left(\frac{x_2}{b}, \frac{y_2}{b}\right), \left(\frac{x_3}{c}, \frac{y_3}{c}\right)$is:

A. $\frac{1}{4}$

B. $\frac{1}{4}abc$

C. $\frac{1}{8}$

D. $\frac{1}{8}abc$

Answer: C

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14. If the square of the matrix $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is the unit matrix of order 2, then α, β and γ should satisfy the relation.

A. $1 + \alpha^2 + B\eta\gamma = 0$

B. $1 - \alpha^2 - B\eta\gamma = 0$

C. $1 - \alpha^2 + B\eta\gamma = 0$

D. $1 + \alpha^2 - B\eta\gamma = 0$

Answer: B

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15. If $\Delta = \begin{vmatrix} a & b & c \\ x & y & z \\ p & q & r \end{vmatrix}$, then $\begin{vmatrix} ka & kb & kc \\ kx & ky & kz \\ kp & kq & kr \end{vmatrix}$ is

A. Δ

B. $k\delta$

C. $3k\Delta$

D. $k^3\Delta$

Answer: D

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16. A root of the equation $\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ 3 & 3 & -6-x \end{vmatrix}$=0 is

A. 6

B. 3

C. 0

D. -6

Answer: C

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17. The value of the determinant of A = $\begin{bmatrix} 0 & a & -b \\ -a & 0 & c \\ b & -c & 0 \end{bmatrix}$ is

A. $-2abc$

B. abc

C. 0

D. $a^2 + b^2 + c^2$

Answer: C

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18. If $x_1, x_2, x(3)$as well as y_1, y_2, y_3 are in geometric progression with the same common ratio,then the points (x_(1),y_(1)),(x_(2),y_(2)),(x_(3),y_(3))`

A. vertices of an equilateral triangle

B. vertices of right angled triangle

C. vertices of right angled isoscles triangle

D. collinear

Answer: D

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19. If $\lfloor . \rfloor$ denotes the greatest integer less than or equal to the real number under consideration and $-1 \leq x < 0, 0 \leq y < 1, 1 \leq z < 2,$ then the value of the determinant $\begin{vmatrix} \lfloor x \rfloor + 1 & \lfloor y \rfloor & \lfloor z \rfloor \\ \lfloor x \rfloor & \lfloor y \rfloor + 1 & \lfloor z \rfloor \\ \lfloor x \rfloor & \lfloor y \rfloor & \lfloor z \rfloor + 1 \end{vmatrix}$ is

A. $\lfloor z \rfloor$

B. $\lfloor y \rfloor$

C. $\lfloor x \rfloor$

D. $\lfloor x \rfloor$+1

Answer: A

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20. If a $\neq$ b, b,c satisfy $\begin{vmatrix} a & 2b & 2c \\ 3 & b & c \\ 4 & a & b \end{vmatrix} = 0$, then abc =

A. a+b+c

B. 0

C. b^3

D. ab+bc

Answer: C

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21. If A = $\begin{vmatrix} -1 & 2 & 4 \\ 3 & 1 & 0 \\ -2 & 4 & 2 \end{vmatrix}$ and $B = \begin{vmatrix} -2 & 4 & 2 \\ 6 & 2 & 0 \\ -2 & 4 & 8 \end{vmatrix}$,then B is given by

A. B=4A

B. B=-4A

C. B=-A

D. B=6A

Answer: B

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22. If A is a skew symmetric matrix of order n and C is a column matrix of order$n \times 1$,thenC^(T)AC`is

A. an identity matrix of order n

B. an identity matrix of order1

C. a zero matrix of order 1

D. an identity matrix of order 2

Answer: C

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23. The matrix A satisfying the equation $\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$ is

A. $\begin{bmatrix} 1 & 4 \\ -1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -4 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -4 \\ 1 & 1 \end{bmatrix}$

Answer: C

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24. If A $+I = \begin{bmatrix} 3 & -2 \\ 4 & 1 \end{bmatrix}$, then (A+I) (A-I) is equal to

A. $\begin{bmatrix} -5 & -4 \\ 8 & -9 \end{bmatrix}$

B. $\begin{bmatrix} -5 & 4 \\ -8 & 9 \end{bmatrix}$

C. $\begin{bmatrix} 5 & 4 \\ 8 & 9 \end{bmatrix}$

D. $\begin{bmatrix} -5 & -4 \\ -8 & -9 \end{bmatrix}$

Answer: A

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25. If A and B are symmetric matrices of same order.Prove that AB-BA is a symmetric matrix?

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Problems For Practice Answer The Following Questions

1. Find x,y,p,q if $\begin{bmatrix} 2x - y & 5 & 5p + 2q \\ p + 2q & x - 2y & -10 \end{bmatrix} = \begin{bmatrix} 0 & 5 & 7 \\ 3 & -3 & -10 \end{bmatrix}$

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2. If A+2B =$[3, 1, 2), (- 4, 0, 5)]$,2A-B=$\begin{bmatrix} 0 & -1 & 7 \\ -2 & 6 & 1 \end{bmatrix}$ find A and B.

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3. If A= $\begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ find A^4.

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4. Solve $\begin{bmatrix} x & 0 & -1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 1 \\ 1 & 1 & 2 \\ -2 & 1 & 0 \end{bmatrix} \begin{bmatrix} x & 1 & 0 \end{bmatrix} = 0$

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5. If A= $\begin{bmatrix} 2 & 1 & 2 \\ 4 & 2 & -3 \\ 0 & 5 & 1 \end{bmatrix}$,B= $\begin{bmatrix} -2 & 1 & 0 \\ 2 & 1 & -1 \\ 1 & 0 & 1 \end{bmatrix}$ .Prove that $(AB)^T = B^T A^T$

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6. Express $\begin{bmatrix} 3 & 2 & -4 \\ 4 & 2 & -3 \\ 0 & 5 & 1 \end{bmatrix}$ as sum of symmetric and skew symmetric matrix.

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7. If $a_{ij} = (2i - j)^2$,find A_{32}.

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8. If $A = \begin{bmatrix} 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$,B= $\begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 1 & 1 \end{bmatrix}$ find AB and BA.

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9. If A= $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 1 & -1 \\ 2 & 4 & 6 \end{bmatrix}$,find det (A^T)

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10. If $\begin{bmatrix} 3 & -2 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \end{bmatrix}$,find x and y.

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11. If A=$\begin{pmatrix} 2 & 3 \\ -1 & 2 \end{pmatrix}$.Show that $A^2-4A+7I=0$whwre I is the unit matrix of order 2.

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12. If A=$\begin{bmatrix} 3 & 4 \\ 4 & -3 \end{bmatrix}$find x if $\det|A-xI|$=0,where I is a unit matrix of order 2.

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13. If $A=\begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix}, B=\begin{bmatrix} 1 & 0 \\ 2 & -2 \end{bmatrix}, C=\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$Show that (i) (A+B)+C=A+(B+C).

(ii)(AB)C=A(BC).

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14. Given $\left|\left(a, a^2, a^3+1\right), \left(b, b^2. b^3+1\right), \left(c, c^2+c^3+1\right)\right| = 0$ and $a \neq b \neq c$.Show that abc=-1

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15. Solve $\begin{vmatrix} x-1 & 0 & 0 \\ 2x & x+3 & 0 \\ 5x-1 & 3x+1 & x-2 \end{vmatrix} = 0$

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16. If A=$\begin{vmatrix} 3 & 2 & -1 \\ 1 & 0 & 2 \\ -2 & 1 & 2 \end{vmatrix}$Prove that

(i)$a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13} = \det(A)$

(ii)$a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{13} = 0$

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17. If A=$\begin{vmatrix} 3 & 2 & 1 \\ 1 & 4 & 0 \\ -1 & 1 & 2 \end{vmatrix}$ and B=$\begin{vmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$.Prove that det(A+2B)=detA+2detB.

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18. If A=$\begin{vmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{vmatrix}$.Find A^n(by mathematical method).

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Problems For Practice Ii Choose The Correct Option From The Following

1. If $a_{ij} = i^2 - j$ and $A = (a_{ij})_{2 \times 2}$is:

A. $\begin{bmatrix} 0 & -1 \\ 3 & 2 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 1 \\ 3 & -2 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 1 \\ -3 & -2 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 1 \\ -3 & 2 \end{bmatrix}$

Answer: A

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2. Solve $\begin{vmatrix} x-1 & 2 \\ 3 & x-2 \end{vmatrix} = 0$

A. (-4,1)

B. (4,-1)

C. (-4,-1)

D. (4,1)

Answer: B

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3. If 2x+ $\begin{bmatrix} 3 & 1 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 3 & -1 \end{bmatrix}$ then x is

A. $\begin{bmatrix} -2 & -2 \\ -1 & -1 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 2 \\ 1 & 1 \end{bmatrix}$

C. $\begin{bmatrix} -2 & 2 \\ -1 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 2 & -2 \\ 1 & -1 \end{bmatrix}$

Answer: C

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4. If $A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & 4 & 2 \\ 1 & 2 & 3 \end{bmatrix}$ and B= $\begin{bmatrix} 3 & 2 & 0 \\ 4 & 8 & 0 \\ -1 & 6 & 2 \end{bmatrix}$,then

A. B=-4A

B. B=4A

C. 2A

D. `-3A

Answer: A

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5. If the points (2,-4)(6,2)(4,x) are collinear than x is:

A. 3

B. -3

C. 0

D. -1

Answer: B

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6. If the square matrix $\begin{vmatrix} \alpha & B\eta \\ B\eta & -\alpha \end{vmatrix}$ is a unit matrix of order 2 then $\alpha$and $B\eta$ should satisfy:

A. $1 + \alpha^2 - B\eta^2 = 0$

B. $1 - \alpha^2 + \alpha B\eta = 0$

C. $1 + \alpha^2 + B\eta^2 = 0$

D. $1 + \alpha B \eta = 0$

Answer: C

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7. A= $\begin{bmatrix} 0 & -2 & 1 \\ 2 & 0 & -4 \\ -1 & 0 & 0 \end{bmatrix}$ then A is

A. Scalar matrix

B. null matrix

C. symmetric matrix

D. skew-symmetric matrix

Answer: D

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8. If A= $\begin{bmatrix} 2x & 2y & 2z \\ 2a & 2b & 2c \\ 2p & 2q & 2r \end{bmatrix}$ and $\Delta = \begin{bmatrix} x & y & z \\ a & b & c \\ p & q & r \end{bmatrix}$ then det A is

A. Δ^(2)`

B. 2Δ

C. 4Δ

D. 8Δ

Answer: D

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9. If A+2I= $\begin{bmatrix} 6 & 2 \\ 3 & -4 \end{bmatrix}$,then A(A+I)=

A. $\begin{bmatrix} 26 & -2 \\ -3 & 36 \end{bmatrix}$

B. $\begin{bmatrix} 4 & 2 \\ 3 & -4 \end{bmatrix}$

C. $\begin{bmatrix} 20 & -2 \\ -3 & 36 \end{bmatrix}$

D. $\begin{bmatrix} 14 & -2 \\ -3 & 36 \end{bmatrix}$

Answer: A

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10. Find the matrix A if $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 6 & 1 \\ 2 & 1 \end{bmatrix}$

A. $\begin{bmatrix} 2 & -1 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 2 & -1 \\ 2 & 1 \end{bmatrix}$

C. $\begin{bmatrix} -2 & 1 \\ 2 & 1 \end{bmatrix}$

D. $\begin{bmatrix} -2 & 1 \\ -2 & -1 \end{bmatrix}$

Answer: B

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11. Find the value of x for which A= $\begin{bmatrix} e^{2x+1} & e^{x-2} \\ e^{2-x} & e^{x-7} \end{bmatrix}$ is singular:

A. -3

B. 3

C. 2

D. -2

Answer: C

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12. If A is $\left(a_{ij}\right)_{m \times n}$,$B = \left(b_{ij} \_ (n \times p)\right), C = \left(c_{ij} \_ (p \times q)\right)$ Then $(ABC)^T$ will of .... Order.

A. $q^2 \times m^2$

B. $m \times p$

C. $m \times q$

D. $q \times m$

Answer: D

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13. Ifr A is a skew symmetrix matrix of order 3 and B is column matrix of order3×1 then$B^T AB$ is

A. zero matrix of order 1

B. identity matrix of order 2

C. identity matrix of order 1

D. identity matrix of order 3

Answer: A

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14. If A= $\begin{bmatrix} 2 & 4 & -5 \\ 3 & 1 & -2 \\ 0 & 2 & -3 \end{bmatrix}$,find the coefficient of order 3:

A. -2

B. 2

C. 0

D. none of these

Answer: B

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15. If A and B are square matrix of same order then $(A-B)^T$ is:

A. A-b

B. $B^T. A^T$

C. $A^T - B^T$

D. $B^T - A^T$

Answer: C

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16. $$\begin{vmatrix} \left(x+\frac{1}{x}\right)^2 & \left(x-\frac{1}{x}\right)^2 & 1 \\ \left(y+\frac{1}{y}\right)^2 & \left(y-\frac{1}{y}\right)^2 & 1 \\ \left(z+\frac{1}{z}\right)^2 & \left(z-\frac{1}{z}\right)^2 & 1 \end{vmatrix}$$

A. x+y+z

B. 1

C. xyz

D. 0

Answer: D

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17. Evaluate $\begin{vmatrix} 45 & 71 & 26 \\ 35 & -21 & 14 \\ 77 & 50 & 40 \end{vmatrix}$:

A. 0

B. 275

C. 572

D. 635

Answer: A

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18. if $\begin{vmatrix} b+c & a-c & a-b \\ b-c & c+a & b-a \\ c-b & c-a & a+b \end{vmatrix} = k(abc)$.Then k is:

A. 2

B. 8

C. 4

D. 1

Answer: B

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19. The area ofΔ with vertices (-2,-3),(3,2),and (-1,x).Then x is:

A. -3

B. -2

C. -8

D. 8

Answer: B

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20. Which of the followinf is not true about the matrix $\begin{bmatrix} 5 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 5 \end{bmatrix}$:

A. upper triangular

B. lower triangular

C. scalar

D. diagonal

Answer: D

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21. The matrix is $\begin{bmatrix} 4 & 3 & 1 \\ 0 & 2 & 3 \\ 0 & 0 & -2 \end{bmatrix}$ is:

A. singular matrix

B. upper traingular matrix

C. lower traingular matrix

D. scalar matrix

Answer: B

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22. If $\begin{vmatrix} 3x+4y & -3 \\ 2 & x+2y \end{vmatrix} = \begin{vmatrix} 7 & -3 \\ 2 & 3 \end{vmatrix}$ then x and y are

A. (2,-2)

B. (0,1)

C. (1,0)

D. (1,1)

Answer: D

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23. The value of determinant $\begin{vmatrix} 25 & 20 & 45 \\ -10 & 10 & 0 \\ 2 & 3 & 5 \end{vmatrix} is$

A. 0

B. 75

C. -35

D. 215

Answer: A

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24. If $A = (a_{ij})_{2 \times 3}, B = (b_{ij})_{2 \times 3}$then the order of AB will be

A. 2×3

B. 3×3

C. not defined

D. 2×2

Answer: C

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25. If $A = (a_{ij})_{2 \times 2}$.Where a_{ij} is given by $(i - 2j)^2$then A is:

A. $\begin{bmatrix} 9 & 1 \\ 4 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 9 & 4 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 3 \\ 0 & 2 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 9 \\ 0 & 4 \end{bmatrix}$

Answer: D

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26. If A=$\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$then A^4 is:

A. $\begin{bmatrix} 1 & 16 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 8 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 4 & 8 \\ 0 & 4 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 4 \\ 0 & 1 \end{bmatrix}$

Answer: B

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27. If A is a square matrix such that $A^2 = A$,then the value of $A + (A - I)^4$is:

A. A

B. 0

C. identity matrix of order 1

D. none of these

Answer: C

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28. If A and B are symmetric matrices of same order than AB-BA is a:

A. skew symmetric matrix

B. symmetric matrix

C. zero matrix

D. unit matrix

Answer: A

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29. Let A=$\left|(a_1, b_1, c_1), (a_2, b_2, c_2), (a_3, b_3 c_3)\right|$then the cofactor of $a_{31}$is:

A. $b_1 c_2 + b_2 c_1$

B. $b_1 b_2 - c_1 c_2$

C. $b_1 c_2 - b_2 c_1$

D. $b_2 c_1 - b_1 c_2$

Answer: C

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30. The area of traingle whose vertices are (0,0),(3,4),and(2,5) is :

A. 7 sq. units

B. 7.5 sq units

C. 5 sq. units

D. 3.5 sq. units

Answer: D

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31. Find the odd man out:

A. $\begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}$

B. $\begin{bmatrix} -2 & 1 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 12 \\ 1 & 6 \end{bmatrix}$

D. $\begin{bmatrix} -5 & -2 \\ 6 & 1 \end{bmatrix}$

Answer: C

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32. Find the odd man out:

A. $\begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 2 & 3 \\ -1 & 3 & 4 \\ 1 & 0 & 2 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 2 & 3 \\ -4 & 1 & 0 \end{bmatrix}$

Answer: D

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33. Find the correct statement:

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34. Find the incorrect statement:

A. For a given matrix $A=(a_{ij})_{3\times 3}$ det A= |A|= $a_{11}A_{11}+a_{12}A_{12}+a_{13}A_{13}$ where A_{ij} is the cofactor of a_{ij}

B. If r rows (columns) are identical in a determinant of order $n \geq r$, when we put x=a then $(x-a)^r$ is a factor of |A|.

C. In matrices, although AB $\neq$ BA in general, we do have `|AB| =|BA|.

D. A square matrix A is said to be non singular if |A| $\neq$ 0.

Answer: B

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35. Find the incorrect statement:

A. The cofactor of 3 in $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 3 \\ 4 & 0 & -1 \end{bmatrix}$ is 4

B. A square matrix A is said to be singular if |A|=0

C. If A and B are square matrices of the same order n then |AB|=|A||B|

D. If any two rows or columns are interchanged then the determinant is zero.

Answer: D

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36. Find the incorrect statement:

A. If two rows (columns) of a matrix are identical then the determinant is zero

B. If A=$\left(a_{ij}\right)_{3 \times 3}$where $a_{ij} = i - j$ is skew symmetric matrix.

C. If A, B, C are three matrices of the same order than $A(BC) \neq (AB)C$

D. If A and B are symmetric matrices of same order then AB -BA is skew symmetric matrix.

Answer: C

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37. The value$|A|^2$where |A|=$\begin{vmatrix} 2 & 5 \\ 1 & 6 \end{vmatrix}$is

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38. The minor of 7 in $\begin{bmatrix} 3 & 1 & 4 \\ -1 & 0 & 3 \\ 6 & 7 & 5 \end{bmatrix}$ is

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39. If A=$\begin{vmatrix} 2 & 1 \\ 1 & 2 \end{vmatrix}, B = \begin{vmatrix} 2 & 4 \\ 1 & 2 \end{vmatrix}$then |AB| is

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40. If $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ is 8 the value of $|2(a_1, 2b_1, 2c_1), (2a_2, 2b_2, 2c_2), (2a_3, 2b_3, 2c_3)|$

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41. Which one of the following is not true about the matrix $\begin{bmatrix} 2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

A. diagonal matrix

B. scalar matrix

C. upper triangular matrix

D. lower triangular matrix

Answer: B

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42. Find which one is true.

If A and B are two matrices such that A+B and BA are both defined then:

A. A and B must be square matrices of same order.

B. A =-B

C. No. of columns of B must be no. of rows of A.

D. A and B are any two matrices.

Answer: A

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43. If A is a square matrix then find the odd man out:

A. $A + A^T$

B. $A.\ A^T$

C. $A^T A$

D. $A - A^T$

Answer: D

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44. If x_1, x_2, x_3 and y_1, y_2, y_3 are in arithmetic progression with the same common difference then the points $(x_1, y_1)(x_2, y_2)(x_3, y_3)$ are:

A. collinear

B. vertices of equilateral triangle

C. vertices of an isosceles triangle

D. none

Answer: A

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45. Let A andB be two skew symmetric matrices of the same order find the incorrect statement:

A. $AB = (BA)^T$

B. $A^T B = AB^T$

C. A+B are symmetric matrix

D. $A + A^T$ is xero matrix.

Answer: C

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46. (i) If A and B are symmetric matrices of same order AB-BA is a skew symmetric matrix.

(ii) $\begin{bmatrix} 1 & -1 & 2 \\ 5 & 7 & 2 \\ 6 & 6 & 4 \end{bmatrix}$ is a singular matrix

(iii)$(AB)^{-1} = A^{-1}B^{-1}$

(iv) If A $= \begin{pmatrix} 1 & 3 \\ 0 & 1 \end{pmatrix}$ thus $A^3 = \begin{pmatrix} 1 & 27 \\ 0 & 1 \end{pmatrix}$.State which option is correct.

A. (i) and (ii) are true

B. (i) and (iii) are true

C. (ii) and (iii) are true

D. (iii) and (iv) are true

Answer: A

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