MATHS

BOOKS - V PUBLICATION

MATRICES

Question Bank

1. If a matrix has 8 elements, what are the possible orders it can have?

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2. Construct a 3×2 matrix whose elements are given by $a_ij = \frac{1}{2}|i - 3j|$

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3. In the matrix A= $\begin{bmatrix} 2 & 5 & 19 & -7 \\ 35 & -2 & \frac{5}{2} & 12 \\ \sqrt{3} & 1 & -5 & 17 \end{bmatrix}$ Write: (i) The order of the matrix ii) The number of elements iii) Write the elements $a_{13}, a_{21}, a_{33}, a_{24}, a_{23}$

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4. If a matrix has 24 elements, What are the possible orders it can have? What, if it has 13 elements?

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5. If a matrix has 18 elements, What are the possible orders it can have? What, if it has 5 elements?

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6. Construct a 2×2 matrix, $A = [[a_{ij}]]$, whose elements are given by: i) $a_{ij} = \frac{(i+j)^2}{2}$ ii) $a_{ij} = \frac{i}{j}$ iii) $a_{ij} = \frac{(i+2j)^2}{2}$

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7. Construct a 3×4 matrix, whose elements are given by: i) $a_{ij} = \frac{1}{2}|-3i+j|$ ii) $a_{ij} = 2i - j$

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8. Find the values of x, y, z from the following equations i) $\begin{bmatrix} 4 & 3 \\ x & 5 \end{bmatrix} = \begin{bmatrix} y & z \\ 1 & 5 \end{bmatrix}$ ii) $\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$ iii) $\begin{bmatrix} x+y+z \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$

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9. Find the value of a,b and c from the following equations,

$$\begin{bmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$$

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10. $A = [aij]_{m \times n}$ is a square matrix, if a) m=n b) m>n c) m< n d) none of these

A. mltn'

B. mgtn'

C. m=n'

D. None of these

Answer: C

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11. Which of the given values of x and y make the following pair of matrices equal

$$\begin{bmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{bmatrix}, \begin{bmatrix} 0 & y-2 \\ 8 & 4 \end{bmatrix}$$

A. x=(-1)/3, y=7'

B. Not possible to find

C. y=7, x=(-2)/3'

D. x=(-1)/3, y=(-2)/3'

Answer: B

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12. The number of all possible matrices of order 3×3 with each entry 0 or 1 is: a)27 B)18 C)81 D)512

A. 27

B. 18

C. 81

D. 512

Answer: D

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13. Given $A = \begin{bmatrix} \sqrt{3} & 1 & -1 \\ 2 & 3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & \sqrt{5} & 1 \\ -2 & 3 & \frac{1}{2} \end{bmatrix}$, find $A + B$

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

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15. If $A = \begin{bmatrix} 8 & 0 \\ 4 & -2 \\ 3 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -2 \\ 4 & 2 \\ -5 & 1 \end{bmatrix}$, then find the matrix X, such that $2A + 3X = 5B$.

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16. Find X and Y, if $X + Y = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$

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17. Find the values of x and y from the following equation: $2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}$

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18. Find AB, if $A = \begin{bmatrix} 6 & 9 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 6 & 0 \\ 7 & 9 & 8 \end{bmatrix}$

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

Show that $AB \neq BA$.

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20. Find AB, if $A = \begin{bmatrix} 0 & -1 \\ 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 5 \\ 0 & 0 \end{bmatrix}$

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21. $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}, C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$ Calculate AC, BC and $(A+B)C$. Also, verify that $(A+B)C = AC + BC$

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22. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, then show that $A^3 - 23A - 40I = 0$

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

Find each of the following:

i) $A + B$

ii) $A - B$

iii) $3A - C$

iv) AB

v) BA

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24. Compute the following:

i) $\begin{bmatrix} a & b \\ -b & a \end{bmatrix} + \begin{bmatrix} a & b \\ b & a \end{bmatrix}$.

ii) $\begin{bmatrix} a^2+b^2 & b^2+c^2 \\ a^2+c^2 & a^2+b^2 \end{bmatrix} + \begin{bmatrix} 2ab & 2bc \\ -2ac & -2ab \end{bmatrix}$

iii) $\begin{bmatrix} -1 & 4 & -6 \\ 8 & 5 & 16 \\ 2 & 8 & 5 \end{bmatrix} + \begin{bmatrix} 12 & 7 & 6 \\ 8 & 0 & 5 \\ 3 & 2 & 4 \end{bmatrix}$

iv) $\begin{bmatrix} \cos^2 x & .\sin^2 x \\ \sin^2 x & \cos^2 x \end{bmatrix} + \begin{bmatrix} \sin^2 x & \cos^2 x \\ \cos^2 x & \sin^2 x \end{bmatrix}$.

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25. Compute the indicated products.

i) $\begin{bmatrix} a & b \\ -b & a \end{bmatrix} \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$

ii) $\begin{bmatrix}1\\2\\3\end{bmatrix}\begin{bmatrix}2 & 3 & 4\end{bmatrix}$

iii) $\begin{bmatrix}1 & (-2)\\2 & 3\end{bmatrix}\begin{bmatrix}1 & 2 & 3\\2 & 3 & 1\end{bmatrix}$

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

v) $\begin{bmatrix}2 & 1\\3 & 2\\(-1) & 1\end{bmatrix}\begin{bmatrix}1 & 0 & 1\\(-1) & 2 & 1\end{bmatrix}$

vi) $\begin{bmatrix}3 & (-1) & 3\\(-1) & 0 & 2\end{bmatrix}\begin{bmatrix}2 & -3\\1 & 0\\3 & 1\end{bmatrix}$

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26. If $A=\begin{bmatrix}1 & 2 & -3\\5 & 0 & 2\\1 & -1 & 1\end{bmatrix}, B=\begin{bmatrix}3 & -1 & 2\\4 & 2 & 5\\2 & 0 & 3\end{bmatrix}$ and $C=\begin{bmatrix}4 & 1 & 2\\0 & 3 & 2\\1 & -2 & 3\end{bmatrix}$ then compute $(A+B)$ and $(B-C)$. Also verify that $A+(B-C)=(A+B)-C$

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27. If $A = \begin{bmatrix} \frac{2}{3} & 1 & \frac{5}{3} \\ \frac{1}{3} & \frac{2}{3} & \frac{4}{3} \\ \frac{7}{3} & 2 & \frac{2}{3} \end{bmatrix}$ and $B = \begin{bmatrix} \frac{2}{5} & \frac{3}{5} & 1 \\ \frac{1}{5} & \frac{2}{5} & \frac{4}{5} \\ \frac{7}{5} & \frac{6}{5} & \frac{2}{5} \end{bmatrix}$ then compute 3A-5B

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28. Simplify $\cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\theta \begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$

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29. Find X and Y, if

i) $X + Y = \begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

ii) $2X + 3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ and $3X + 2Y = \begin{bmatrix} 2 & (-2) \\ (-1) & 5 \end{bmatrix}$

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30. Find X, if $Y = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ and $2X + Y = \begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$

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31. Find x and y if $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$

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32. Solve the equation for x, y, z and t, if $2\begin{bmatrix} x & z \\ y & t \end{bmatrix} + 3\begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix} = 3\begin{bmatrix} 3 & 5 \\ 4 & 6 \end{bmatrix}$

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33. If $x\begin{bmatrix} 2 \\ 3 \end{bmatrix} + y\begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$ find the values of x and y.

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34. Given $3\begin{bmatrix} x & y \\ z & w \end{bmatrix} = \begin{bmatrix} x & 6 \\ -1 & 2w \end{bmatrix} + \begin{bmatrix} 4 & x+y \\ z+w & 3 \end{bmatrix}$

find the values of x,y,z and w

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35. $F(x) = \begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$ Show that

$F(x)F(y) = F(x+y)$

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36. Show that

i) $\begin{bmatrix} 5 & (-1) \\ 6 & 7 \end{bmatrix}\begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix} \neq \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} 5 & (-1) \\ 6 & 7 \end{bmatrix}$

ii)

$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}\begin{bmatrix} (-1) & 1 & 0 \\ 0 & (-1) & 1 \\ 2 & 3 & 4 \end{bmatrix} \neq \begin{bmatrix} (-1) & 1 & 0 \\ 0 & (-1) & 1 \\ 2 & 3 & 4 \end{bmatrix}\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$

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37. Find $A^2 - 5A + 6I$, if $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$

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38. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, prove that $A^3 - 6A^2 + 7A + 2I = 0$

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39. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find k so that $A^2 = kA - 2I$

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40. If $A = \begin{bmatrix} 0 & -\tan\left(\frac{\alpha}{2}\right) \\ \tan\left(\frac{\alpha}{2}\right) & 0 \end{bmatrix}$ and I is the identity matrix of order 2 , show that $I + A = (I - A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

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41. A trust fund has Rs. 30,000 that must be invested in two different types of bonds. The first bond pays 5% interest per year and the seconnd bond pays 7% interest per year. Using matrix multiplication, determine how to divide Rs. 30,000 among the two types of bonds, if the trust fund must obtain an annual total interest of:

Rs. 1800

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42. The bookshop of a particular school has 10 dozen chemistry books, 8 dozen physics books, 10 dozen economics books. Their selling prices are Rs. 80, Rs. 60 and Rs. 40 each respectively. Find the total amount the book-shop will receive from selling all the books using matrix algebra.

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43. Assume that X,Y,Z,W and P are matrices of order $2 \times n, 3 \times k, 2 \times p,$

$n \times 3$ and $p \times k$ respectively. Choose the correct answer in the following

cases. The restriction on n,k and p so that PY+WY will be defined are:

A. 'k=3, p=n'

B. 'k' is arbitrary 'p=2'

C. 'p' is arbitrary, 'k=3'

D. 'k=2, p=3'

Answer: A

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44. Assume that X,Y,Z,W and P are matrices of order $2 \times n, 3 \times k, 2 \times p,$

$n \times 3$ and $p \times k$ respectively. Choose the correct answer in the following cases. If n=p, then the order of the matrix 7X-5Z is:

A. 'p xx 2'

B. '2 xx n'

C. 'n xx 3 n'

D. 'p xx n'

Answer: B

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45. If $A = \begin{bmatrix} 3 & \sqrt{3} & 2 \\ 4 & 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & (-1) & 2 \\ 1 & 2 & 4 \end{bmatrix}$, verify that

i. $(A')' = A$

ii. $(A + B)' = A' + B'$

iii. $(kB)' = kB'$, where k is any constant.

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46. If $A = \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}$ $B = [1 \quad 3 \quad 6]$

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

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47. For any square matrix A with real number entries.Prove that $A + A'$ is a symmetric matrix and $A - A'$ is a skew symmetric matrix.

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48. Prove that any square matrix can be expressed as the sum of a symmetic and a skew symmetric matrix.

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49. Express the matrix

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

as the sum of a symmetric and a skew symmetric matrices.

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50. Find the transpose of each of the following matrices: (i) $\begin{bmatrix} 5 \\ \frac{1}{2} \\ -1 \end{bmatrix}$

ii) $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ (iii) $\begin{bmatrix} -1 & 5 & 6 \\ \sqrt{3} & -5 & 6 \\ 2 & 3 & -1 \end{bmatrix}$

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

(i) $(A + B)' = A' + B'$

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52. If $A' = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$ then verify that

1)$(A + B)' = A' + B'$

2) $(A - B)' = A' - B'$

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53. If $A' = \begin{bmatrix} -2 & 3 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 \\ 1 & 2 \end{bmatrix}$, then find $(A + 2B)'$

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54. For the matrices A and B verify that, $(AB)' = B'A'$, where

i) $A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$, $B = [-1 \quad 2 \quad 1]$ ii) $A = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}$, $B = [1 \quad 5 \quad 7]$

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55. if $A = \begin{bmatrix} \sin\alpha & \cos\alpha \\ -\cos\alpha & \sin\alpha \end{bmatrix}$, then verify $A^T A = I$

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56. show that the matrix A= $\begin{bmatrix} 1 & -1 & 5 \\ -1 & 2 & 1 \\ 5 & 1 & 3 \end{bmatrix}$ is a symmetric matrix

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57. For the matrix $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, verify that

i) $(A + A')$ is a symmetric matrix.

ii) $(A - A')$, is a skew symmetric matrix.

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58. Find $\frac{1}{2}(A + A^T)$ and $\frac{1}{2}(A - A^T)$ where $A = \begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$

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59. Express the following matrices as the sum of a Symmetric and a Skew Symmetric matrix.

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

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60. If A, B are symmetric matrices of same order, then $AB - BA$ is a

A) skew symmetric matrix,

B) Symmetric matrix,

C) Zero matrix,

D) Identity matrix

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61. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then $A + A^T = I$ if the value of α is

A. 'pi/6'

B. 'pi/3'

C. 'pi'

D. '(3 pi)/2'

Answer:

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62. Find P^{-1}, if it exists, given

$P = \begin{bmatrix} 10 & -2 \\ -5 & 1 \end{bmatrix}$

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63. Find the inverse of each of the matrices using elementary operations $\begin{bmatrix} 1 & 3 \\ 2 & 7 \end{bmatrix}$

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64. Find the inverse of the following using elementary transformations. $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$

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65. Find the inverse of the following using elementary transformations. $A = \begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$

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66. Find the inverse of the following using elementary transformations. $A = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$

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67. Using elementry transformation, find the inverse of the matrices.

$A = \begin{bmatrix} 4 & 5 \\ 3 & 4 \end{bmatrix}$

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68. Find the inverse of the each of the matrices using elementary transformations

$\begin{bmatrix} 3 & 10 \\ 2 & 7 \end{bmatrix}$

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69. Find the inverse of each of the following using elementary transformations $\begin{bmatrix} 3 & -1 \\ -4 & 2 \end{bmatrix}$

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70. Find the inverse of $A = \begin{bmatrix} 2 & -6 \\ 1 & -2 \end{bmatrix}$

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71. Find the inverse of each of the following using elementary transformations $\begin{bmatrix} 6 & -3 \\ -2 & 1 \end{bmatrix}$

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72. Find the inverse of the following using elementary transformations $\begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}$

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73. Find the inverse of the following matrices if it exists. $\begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$

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74. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then prove that $A^n = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}, n \in N.$

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75. If A and B are symmetric matrices of the same order, then show that AB is symmetric if and only if A and B commute, that is $AB = BA.$

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76. Let $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$, Find a matrix D such that $CD - AB = 0$

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77. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$, prove that $A^n = \begin{bmatrix} 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \\ 3^{n-1} & 3^{n-1} & 3^{n-1} \end{bmatrix}$ $n \in N$.

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78. if $A = \begin{bmatrix} 3 & -4 \\ 1 & (-1) \end{bmatrix}$, then prove that $A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$ where n is any positive integer.

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79. If A and B are symmetric matrices, prove that $AB - BA$ is a skew symmetric matrix.

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80. Show that the matrix $B'AB$ is symmetric or skew symmetric according as A is symmetric or skew symmetric.

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81. Find the values of x, y, z, if the matrix $A = \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ satisfy the equation $A'A = I$

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82. For what values of x : $\begin{bmatrix}1 & 2 & 1\end{bmatrix}\begin{bmatrix}1 & 2 & 0\\ 2 & 0 & 1\\ 1 & 0 & 2\end{bmatrix}\begin{bmatrix}0\\ 2\\ x\end{bmatrix}=0$?

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83. If $A=\begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$ then

Hence show that $A^2-5A+7I=0$

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84. Find x, if $\begin{bmatrix}x & -5 & -1\end{bmatrix}\begin{bmatrix}1 & 0 & 2\\ 0 & 2 & 1\\ 2 & 0 & 3\end{bmatrix}\begin{bmatrix}x\\ 4\\ 1\end{bmatrix}=0$

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85. Find the matrix X so that $X\begin{bmatrix}1 & 2 & 3\\ 4 & 5 & 6\end{bmatrix}=\begin{bmatrix}-7 & -8 & -9\\ 2 & 4 & 6\end{bmatrix}$

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86. If A and B are square matrices of the same order such that $AB = BA$,then prove by induction that $AB^n = B^nA$. Further, prove that $(AB)^n = A^nB^n$ for all $n \in N$.

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87. If $A = \begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is such that $A^2 = I$, then A) $1 + \alpha^2 + \beta\gamma = 0$ B) $1 - \alpha^2 + \beta\gamma = 0$ C)$1 - \alpha^2 - \beta\gamma = 0$ D) $1 + \alpha^2 - \beta\gamma = 0$

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

B. '1-alpha^2+beta y=0'

C. '1-alpha^2-beta gamma=0^'

D. '1+alpha^2-beta gamma=0'

Answer: C

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88. If the matrix A is both symmetric and skew symmetric, then: A)A is a diagonal matrix B)A is a zero matrix. C) A is a square matrix D)None of these.

A. A is a diagónal matrix

B. 'A' is a zerómatrix.

C. 'A' is a square matrix

D. None of these.

Answer: B

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89. If A is a square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to A)A B)$I - A$ C)I D)$3A$

A. 'A'

B. 'I-A'

C. I'

D. '3 A'

Answer: C

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90. Construct a $m \times n$ matrix $A = [[a_{ij}]]$ whose elements a_{ij} is given by $a_{ij} = \frac{3i - j}{2}, m = 2, n = 3$

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91. If $\begin{bmatrix} a+b & 2 \\ 5 & ab \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$, find the values of a and b

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92. Complete the following product $\begin{bmatrix} 1 & 0 & -5 \\ 2 & 0 & 4 \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 0 & -1 \\ 0 & 5 \end{bmatrix}$

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93. Find the product $\begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix} [1 \quad 3 \quad 6]$

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94. If ω is a complex cube root of unity, show that

$$\begin{bmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{bmatrix} \begin{bmatrix} 1 \\ \omega \\ \omega^2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

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95. If $A_\alpha = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then prove that

i) $A_\alpha . A_\beta = A_{\alpha+\beta}$

ii) $(A_\alpha)^n = \begin{bmatrix} \cos n\alpha & \sin n\alpha \\ -\sin n\alpha & \cos n\alpha \end{bmatrix}$ for every positive integer n.

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96. Show that the matrix $A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -1 & 1 \\ 1 & -1 & 1 \end{bmatrix}$ is idempotent

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97. There are three families. Family A consists of 2 men, 3 women and 1 child. Family B has 2 men, 1 woman and 3 children. Family C has 4 men, 2 women and 6 children. Daily income of men and

women as Rs. 200 and Rs. 150 respectively and children have no income. Using matrix multiplication calculate daily income of each family.

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98. Express $\begin{bmatrix} 4 & 3 & 7 \\ 6 & 5 & -8 \\ 1 & 2 & 6 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrix

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99. a) Construct a 3×3 matrix A whose elements are given by $a_{ij} = 2i - j$ b) If $B = \begin{bmatrix} 3 & 1 \\ 0 & 2 \\ 1 & -5 \end{bmatrix}$, find AB.

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100. $A = \begin{bmatrix} 1 & 4 & -1 \\ 2 & 5 & 4 \\ -1 & -6 & 3 \end{bmatrix}$ Write A as the sum of a symmetric matrix and a skew symmetric matrix.

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