MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

ADJOINT AND INVERSE OF A MATRIX

Solved Examples

1. If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$, find adj A.

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2. If $A = \begin{bmatrix} 1 & -2 & 4 \\ 0 & 2 & 1 \\ -4 & 5 & 3 \end{bmatrix}$ find adj A.

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3. If $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$, verify that

$A.(\text{adj } A) = (\text{adj } A).A = |A|.I.$

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4. If $A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$, verify that

A.(adj A) = (adj A). A= |A|.I.

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5. Find the inverse of the matix, $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$.

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6. Find the inverse of the matrix $\begin{bmatrix} 3 & -10 & -1 \\ -2 & 8 & 2 \\ 2 & -4 & -2 \end{bmatrix}$.

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7. If $A = [3275]$ and $B = [6789]$, verify that $(AB)^{-1} = B^{-1}A^{-1}$.

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8. If $A = \begin{vmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{vmatrix}$, then show that $A^2 - 4A - 5I_3 = 0$. Hemce find A^{-1}.

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9. Find a matrix X such that $X.\begin{bmatrix} 3 & 2 \\ 1 & -1 \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$.

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10. if $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} A \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then $A = ?$

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11. If $A = \begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$ verify that $(adjA)^{-1} = (adjA^{-1})$.

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12. Let $A = \begin{bmatrix} 1 & -2 & 1 \\ -2 & 3 & 1 \\ 1 & 1 & 5 \end{bmatrix}$. Verify that ltbtgt (i) $[adjA]^{-1} = adj(A^{-1})$

(ii) $(A^{-1} \hat{} (-1) = A$

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13. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$ and " verify that "(A')^(-1)=(A^(-1))'`.

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14. If $A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, show that $A'A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$.

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15. Let $F(a) = \begin{bmatrix} \cos a & -\sin a & 0 \\ \sin a & \cos a & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $G(B) = \begin{bmatrix} \cos B & 0 & \sin B \\ 0 & 1 & 0 \\ -\sin B & 0 & \cos B \end{bmatrix}$ Show tl

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Exercise 7

1. Find the adjoint of the given matrix and verify in each case that $A.(adjA) = (adjA).A = |A|.I.$

$\begin{bmatrix} 2 & 3 \\ 5 & 9 \end{bmatrix}$

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2. Find the adjoint of the given matrix and verify in ach case that $A.(adjA) = (adjA).A = |A|.I.$

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

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3. Find the adjoint of the given matrix and verify in each case that $A.(adjA) = (adjA).A = |A|.I.$ $\begin{bmatrix} \cos a & \sin a \\ \sin a & \cos a \end{bmatrix}$

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4. Find the adjoint of the given matrix and verify in each case that $A.(adjA) = (adjA).A = |A|.I.$

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

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5. Find the adjoint of the given matrix and verify in ach case that $A.(adjA) = (adjA).A = |A|.I.$

$$\begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$$

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6. Find the adjoint of the given matrix and verify in ach case that $A.(adjA) = (adjA).A = |A|.I.$

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

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7. Find the adjoint of the given matrix and verify in ach case that $A.(adjA) = (adjA).A = |A|.I.$

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

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8. Find the adjoint of the given matrix and verify in ach case that $A.(adjA) = (adjA).A = |A|.I.$

$$\begin{bmatrix} 4 & 5 & 3 \\ 1 & 0 & 6 \\ 2 & 7 & 9 \end{bmatrix}$$

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9. Find the adjoint of the given matrix and verify in ach case that $A.(adjA) = (adjA).A = |A|.I.$

$$\begin{bmatrix} \cos a & -\sin a & 0 \\ \sin a & \cos a & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

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10. Find the adjoint of the given matrix and verify in ach case that $A.(adjA) = (adjA).A = |A|.I.$

If $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$,show that adj A=A.

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11. Find the adjoint of the given matrix and verify in each case that $A.(adjA) = (adjA).A = |A|.I.$ If $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$.

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12. Find the inverse of each of the matrices given below :

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

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13. Find the inverse of each of the matrices given below :

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

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14. Find the inverse of each of the matrices given below :

$$\begin{bmatrix} 2 & -3 \\ 4 & 6 \end{bmatrix}$$

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15. Find the inverse of each of the matrices given below :

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}, when(ad - bc) \neq 0$$

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16. Find the inverse of each of the matrices given below :

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

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17. Find the inverse of each of the matrices given below :

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

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18. Find the inverse of given matrix $\begin{bmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{bmatrix}$

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19. Find the inverse of each of the matrices given below :

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

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20. Find the inverse of each of the matrices given below :

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

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21. Find the inverse of each of the matrices given below :

$$\begin{bmatrix} 8 & -4 & 1 \\ 10 & 0 & 6 \\ 8 & 1 & 6 \end{bmatrix}$$

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22. Find the inverse of each of the matrices given below :

If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, show that $A^{-1} = \frac{1}{19}A$.

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23. Find the inverse of each of the matrices given below :

If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & -1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, show that $A^{-1} = A^2$

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24. Find the inverse of each of the matrices given below :

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

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25. If $A = \frac{1}{9}\begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$, show that $A^{-1} = A'$.

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26. Find the inverse of each of the matrices given below :

Let $D = \text{diag}[d_1, d_2, d_3]$ where none of d_1, d_2, d_3 is), prove that

$D^{-1} = \text{diag}\left[d_1^{-1}, d_2^{-1}, d_3^{-1}\right]$.

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27. Find the inverse of each of the matrices given below :

If $A = \begin{bmatrix} 3 & 2 \\ 7 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 7 \\ 8 & 9 \end{bmatrix}$, verify that $(AB)^{-1} = B^{-1}A^{-1}$.

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28. Find the inverse of each of the matrices given below :

If

$A = \begin{bmatrix} 9 & -1 \\ 6 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 3 \\ 5 & -4 \end{bmatrix}$, verify that $(AB)^{-1} = B^{-1}A^{-1}$

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29. Find the inverse of each of the matrices given below : Compute $(AB)^{-1} when A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & -1 \\ 1 & 0 & 2 \end{bmatrix}$. Find

`A^(-1).

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30. Find the inverse of each of the matrices given below :

Obtain the inverse of the matrics $\begin{bmatrix} 1 & p & 0 \\ 0 & 1 & p \\ 0 & 0 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 0 & 0 \\ q & 1 & 0 \\ 0 & q & 1 \end{bmatrix}$. And, hence find the inverse of the matrix $\begin{bmatrix} (1+pq) & p & 0 \\ q & (1+pq) & p \\ 0 & q & 1 \end{bmatrix}$.

Let the first two matrices be A and B. Then, the third matrix is AB. Now,

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

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31. Find the inverse of each of the matrices given below :

If $A = \begin{bmatrix} 3 & 2 \\ 2 & 1 \end{bmatrix}$, verify that $A^2 - 4A - I = O$, and hence find A^{-1}.

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32. Find the inverse of each of the matrices given below :

Show that the matrix $A = \begin{bmatrix} -8 & 5 \\ 2 & 4 \end{bmatrix}$ satisfies the equation $A^2 + 4A - 42I = 0$ and hence find A^{-1}.

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33. Find the inverse of each of the matrices given below :

If

$A = \begin{bmatrix} -1 & -1 \\ 2 & -2 \end{bmatrix}$ show that $A^2 + 3A + 4I_2 = O$ and hence find A^{-1}

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34. Find the inverse of each of the matrices given below :

if $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$ find x and y such that $A^2 = \delta A - 2I$. Hence , find A^{-1}.

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35. Find the inverse of each of the matrices given below :

If $A = \begin{bmatrix} 3 & 2 \\ 4 & -2 \end{bmatrix}$, find the value of δ so that $A^2 = \delta A - 2I$. Hence, find A^{-1}.

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36. Show that the matrix, $A = [10 - 2 - 2 - 12341]$ satisfies the equation, $A^3 - A^2 - 3A - I_3 = O$. Hence, find A^{-1}.

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37. Prove that : (i) $\text{adj } I = I$ (ii) $\text{adj } O = O$ (iii) $I^{-1} = I$.

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