

1. Is the operation of  $A(B + C)^T D^T$  feasible for matrices with dimensions:  $A 7 \times 4$ ,  $B 9 \times 4$ ,  $C 9 \times 4$ ,  $D 9 \times 4$ ?
2. Can the product of non-square matrices be a square matrix? Give an example.
3. Are two identity matrices equal? Give an example.
4. Does multiplying a matrix by an identity matrix change the dimension of that matrix? give an example.
5. In the equation  $AI = IA$ , are the identity matrices on the left and right sides of the equation always equal? Give an example.
6. Give an example of matrices  $A$  and  $B$  that  $AB \neq BA$ .
7. What is the result  $(A^T)^T$ ? Give an example.
8. Give an example of the matrix  $A$  for which  $A = A^T$ .
9. Calculate  $\begin{bmatrix} 1 & -2 \\ 3 & -4 \end{bmatrix}^2$ .
10. Calculate the product of  $[1 \ 0 \ 2]$  and  $\begin{bmatrix} 1 & 3 \\ 7 & 5 \\ 0 & 2 \end{bmatrix}$ .
11. Transpose  $\begin{bmatrix} 2 & 3 & 1 & 4 \\ -1 & 2 & 0 & 1 \\ 2 & 2 & 0 & 1 \end{bmatrix}$ .
12. Transpose  $[1 \ 2 \ -1 \ 4]$ . And then give the dimension of the resulting matrix.
13. Add and subtract matrices  $\begin{bmatrix} 2 & -1 \\ 1 & 5 \\ 4 & 2 \end{bmatrix}$  i  $\begin{bmatrix} 1 & 3 \\ 7 & 5 \\ 0 & 2 \end{bmatrix}$ .
14. Find  $a$  i  $b$ , that  $\begin{bmatrix} a & 2 \\ -2 & b \end{bmatrix} \cdot \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 4 & 6 \\ 3 & 1 \end{bmatrix}^T$ .
15. Calculate  $\begin{vmatrix} 2 & 2 \\ 1 & 4 \end{vmatrix}$ .
16. Calculate  $\begin{vmatrix} 5 & -1 & 3 \\ 0 & 1 & -2 \\ 4 & 3 & 2 \end{vmatrix}$ .
17. Calculate  $\begin{vmatrix} 1 & 2 & 3 & 4 \\ 0 & 5 & 6 & 7 \\ 0 & 0 & 8 & 9 \\ 0 & 0 & 0 & 10 \end{vmatrix}$ .
18. Calculate  $2 \begin{bmatrix} -1 & 1 \\ 1 & -2 \end{bmatrix}^T + 5I$ .
19. Give an example for operation  $(FE)^T = E^T F^T$ .
20. Give an example for operation  $(F + E)^T = F^T + E^T$ .