MATRICES

ELEMENTARY OPERATION OF A MATRIX

EXERCISE

Q.1 What is the total number of elementary operations that can be performed on matrices?

(a) 3 (b) 2 (c) 6 (d) 5

Q.2 After applying the operation $R_1 \to R_1 + R_2$ to the matrix $A = \begin{bmatrix} 2 & 3 \\ 6 & 4 \end{bmatrix}$, which of the following matrices will be the resulting new matrix?

(a) $\begin{bmatrix} 8 & 7 \\ 6 & -4 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 7 \\ 6 & 4 \end{bmatrix}$

(c) $\begin{bmatrix} 8 & 7 \\ 6 & 5 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & 7 \\ 6 & 2 \end{bmatrix}$

Q.3 If the elementary operation $R_1 \to 2R_1 + 3R_2$ is applied to the matrix, which of the following matrices will remain unchanged?

(a) $\begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 1 & 2 \\ 1 & 0 \end{bmatrix}$

Q.4 Which one of the following does not qualify as a valid elementary operation?

(a) $R_i \leftrightarrow R_j$ (b) $R_i \to R_j + kR_i$

(c) $R_i \to kR_i$ (d) $R_i \to 1 + kR_i$

Q.5 Which elementary operation has been performed on the matrix $A=\begin{bmatrix}8 & 5\\ 2 & 8\end{bmatrix}$ to transform it into $\begin{bmatrix}12 & 21\\ 2 & 8\end{bmatrix}$

(a) $R_1 \rightarrow R_1-2R_2$ (b) $R_1 \rightarrow 2R_1+R_2$

(c) $R_1 \rightarrow R_2+R_1$ (d) $R_1 \rightarrow R_1+2R_2$

Q.6 After implementing the following elementary operations on the matrix

$$A=\begin{bmatrix}4 & 5 & 2\\ 6 & 7 & 1\\ 3 & 9 & 5\end{bmatrix},\ R_1 \rightarrow 2R_1+3R_2,\ R_2 \rightarrow 3R_2-2R_3$$

Which of the following matrices will be the resulting new matrix?

$(a)\begin{bmatrix}24 & 31 & 7\\ 12 & 3 & 7\\ 3 & 9 & 5\end{bmatrix}$ (b) $\begin{bmatrix}24 & 31 & 7\\ 12 & 3 & -7\\ 3 & 9 & 5\end{bmatrix}$

(c) $\begin{bmatrix}24 & 31 & 7\\ 6 & 7 & 1\\ 3 & 9 & 5\end{bmatrix}$ (d) $\begin{bmatrix}4 & 5 & 2\\ 6 & 7 & 1\\ 3 & 9 & 5\end{bmatrix}$

Q.7 The matrix resulting from the elementary operation $R_2 \rightarrow 2R_2+3R_1$ applied to the original matrix $A=\begin{bmatrix}2 & 5 & 4\\ 5 & 2 & 6\\ 7 & 2 & 1\end{bmatrix}$ is

(a) $\begin{bmatrix}2 & 5 & 4\\ 16 & 19 & 24\\ 7 & 2 & 1\end{bmatrix}$ (b) $\begin{bmatrix}2 & 5 & 4\\ 19 & 19 & 24\\ 7 & 2 & 1\end{bmatrix}$

(c) $\begin{bmatrix}2 & -5 & 4\\ 16 & 19 & 24\\ 7 & 2 & 1\end{bmatrix}$ (d) $\begin{bmatrix}1 & 5 & 4\\ 16 & 19 & 24\\ 7 & 2 & 1\end{bmatrix}$

Q.8 What is the new matrix after applying the elementary operation $C_1 \rightarrow 4C_1$ to the matrix $A = \begin{bmatrix} 5 & 8 \\ -1 & 2 \\ 3 & -4 \end{bmatrix}$

(a) $\begin{bmatrix} 5 & 8 \\ -1 & 2 \\ 3 & -4 \end{bmatrix}$

(b) $\begin{bmatrix} 20 & 8 \\ -4 & 2 \\ 12 & -4 \end{bmatrix}$

(c) $\begin{bmatrix} 20 & 8 \\ 4 & 2 \\ 12 & -4 \end{bmatrix}$

(d) $\begin{bmatrix} 20 & 8 \\ -4 & 2 \\ 12 & 4 \end{bmatrix}$

Q.9 After applying the following column matrix operations:

$$A = \begin{bmatrix} -7 & 2 & 6 \\ -2 & 3 & -5 \\ 2 & 1 & 3 \end{bmatrix}, C_2 \rightarrow 2C_1 + C_2, C_3 \rightarrow 3C_1 + 2C_3$$

Which of the following matrices will be the resulting new matrix?

(a) $\begin{bmatrix} -7 & -12 & 6 \\ 2 & -1 & -5 \\ 2 & -5 & 3 \end{bmatrix}$

(b) $\begin{bmatrix} -7 & -12 & 6 \\ -2 & -1 & -5 \\ 2 & 5 & 3 \end{bmatrix}$

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

(d) $\begin{bmatrix} -7 & -12 & -9 \\ -2 & -1 & -16 \\ 2 & 5 & 12 \end{bmatrix}$

Q.10 Which one of the following column operations is not accurate for the given matrix $A = \begin{bmatrix} 1 & 2 & 5 \\ 6 & 3 & 8 \end{bmatrix}$

(a) $C_1 \rightarrow 3C_1$

(b) $C_2 \rightarrow C_1 + C_2$

(c) $C_2 \rightarrow 2 + 2C_2$

(d) $C_2 \rightarrow 2C_1 + 2C_2 - C_3$

ANSWER KEY

1. (c) 6

2. (b) $\begin{bmatrix} 8 & 7 \\ 6 & 4 \end{bmatrix}$

3. (b) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

4. (d) $R_i \rightarrow 1+kR_i$

5. (d) $R_1 \rightarrow R_1+2R_2$

6. (b) $\begin{bmatrix} 24 & 31 & 7 \\ 12 & 3 & -7 \\ 3 & 9 & 5 \end{bmatrix}$

7. (a) $\begin{bmatrix} 2 & 5 & 4 \\ 16 & 19 & 24 \\ 7 & 2 & 1 \end{bmatrix}$

8. (b) $\begin{bmatrix} 20 & 8 \\ -4 & 2 \\ 12 & -4 \end{bmatrix}$

9. (d) $\begin{bmatrix} -7 & -12 & -9 \\ -2 & -1 & -16 \\ 2 & 5 & 12 \end{bmatrix}$

10. (c) $C_2 \rightarrow 2+2C_2$