Expansion By Minors

1. $\begin{vmatrix} 1 & 2 & 1 \\ 3 & 4 & 2 \\ 5 & 6 & 3 \end{vmatrix}$; row 1

2. $\begin{vmatrix} 1 & -1 & 2 \\ 4 & 0 & 1 \\ 2 & 1 & 3 \end{vmatrix}$; column 2

3. $\begin{vmatrix} 3 & 1 & -2 \\ 2 & -1 & 2 \\ 1 & 1 & 0 \end{vmatrix}$; row 3

4. $\begin{vmatrix} 1 & -1 & 4 \\ 1 & -2 & 5 \\ 1 & -3 & 6 \end{vmatrix}$; column 1

5. $\begin{vmatrix} 0 & -1 & -2 \\ 1 & 3 & 0 \\ 2 & 4 & 1 \end{vmatrix}$; row 2

6. $\begin{vmatrix} 1 & 2 & 0 \\ 3 & 1 & 1 \\ -1 & 4 & 1 \end{vmatrix}$; column 3

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

8. $\begin{vmatrix} 3 & 2 & 4 \\ -2 & 1 & 6 \\ 0 & 2 & 1 \end{vmatrix}$

9. $\begin{vmatrix} 0 & 2 & 4 \\ 2 & 6 & 3 \\ 0 & 7 & 4 \end{vmatrix}$

10. $\begin{vmatrix} 3 & 2 & 3 \\ 1 & -4 & 2 \\ 0 & 0 & 1 \end{vmatrix}$

Solve for “x”

11. $\begin{vmatrix} 3 & 1 & -2 \\ 0 & x & 1 \\ 4 & -2 & -1 \end{vmatrix} = 0$

12. $\begin{vmatrix} x & 2 & 3 \\ 1 & x & 3 \\ 1 & -1 & 1 \end{vmatrix} = 5$

Evaluate:

13. $\begin{vmatrix} 1 & 0 & 1 & 0 \\ 3 & -1 & 0 & 2 \\ 1 & 4 & 1 & 1 \\ 3 & 1 & -1 & 2 \end{vmatrix}$

14. $\begin{vmatrix} 1 & -3 & 2 & 1 \\ 2 & -1 & 3 & 0 \\ 3 & 2 & 1 & 0 \\ -1 & 1 & 3 & 1 \end{vmatrix}$