Tips and Tricks:

NOTE: After analysing many JEE Exam questions, I can surly say that determinants properties are used in every question that comes from this chapter. So go to NCERT book chapter and learn these properties. If you know these properties, then det. questions can be solved pretty fast; otherwise these can waste precious exam time.

Do remember these properties:

Important Properties of Determinants

1. Reflection Property:

The determinant remains unaltered if its rows are changed into columns and the columns into rows. This is known as the property of reflection.

2. All-zero Property:

If all the elements of a row (or column) are zero, then the determinant is zero.

3. Proportionality (Repetition) Property:

If the all elements of a row (or column) are proportional (identical) to the elements of some other row (or column), then the determinant is zero.

4. Switching Property:

The interchange of any two rows (or columns) of the determinant changes its sign.

5. Scalar Multiple Property:

If all the elements of a row (or column) of a determinant are multiplied by a non-zero constant, then the determinant gets multiplied by the same constant.

6. Sum Property:

$$\begin{vmatrix} a_1+b_1 & c_1 & d_1 \\ a_2+b_2 & c_2 & d_2 \\ a_3+b_3 & c_3 & d_3 \end{vmatrix} = \begin{vmatrix} a_1 & c_1 & d_1 \\ a_2 & c_2 & d_2 \\ a_3 & c_3 & d_3 \end{vmatrix} + \begin{vmatrix} b_1 & c_1 & d_1 \\ b_2 & c_2 & d_2 \\ b_3 & c_3 & d_3 \end{vmatrix}$$

7. Property of Invariance:

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = \begin{vmatrix} a_1+\alpha b_1+\beta c_1 & b_1 & c_1 \\ a_2+\alpha b_2+\beta c_2 & b_2 & c_2 \\ a_3+\alpha b_3+\beta c_3 & b_3 & c_3 \end{vmatrix}$$

That is, a determinant remains unaltered under an operation of the form $C_i \to C_i + \alpha C_j + \beta C_k$, where $j, k \neq i$, or an operation of the form

$R_i \to R_i + \alpha R_j + \beta R_k$, where $j, k \neq i$

8. Factor Property:

If a determinant Δ becomes zero when we put $x = \alpha$, then $(x - \alpha)$ is a factor of Δ.

9. Triangle Property:

If all the elements of a determinant above or below the main diagonal consist of zeros, then the determinant is equal to the product of diagonal elements. That is,

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ 0 & b_2 & b_3 \\ 0 & 0 & c_3 \end{vmatrix} = \begin{vmatrix} a_1 & 0 & 0 \\ a_2 & b_2 & 0 \\ a_3 & b_3 & c_3 \end{vmatrix} = a_1 b_2 c_3$$