(ii) $In\ the\ above\ expansion, the\ (m+1)-th\ term\ will\ be\ greatest\ if\ \frac{(n+1)x}{a+x} = a\ \ +ve\ integer\ \ (m)$

$+\ a\ proper\ fraction.$

Determinant

General Form:-

$$D = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = a_1b_2 - a_2b_1$$

$$D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = a_1(b_2c_3 - b_3c_2) - b_1(a_2c_3 - a_3c_2) + c_1(a_2b_3 - a_3b_2)$$

Symbolic Form:-

$$\begin{vmatrix} + & - \\ - & + \end{vmatrix} \qquad \begin{vmatrix} + & - & + \\ - & + & - \\ + & - & + \end{vmatrix}$$

Addition of Determinants:-

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} + \begin{vmatrix} l_1 & m_1 & n_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = \begin{vmatrix} a_1 + l_1 & b_1 + m_1 & c_1 + n_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$$

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} + \begin{vmatrix} l_1 & b_1 & c_1 \\ l_2 & b_2 & c_2 \\ l_3 & b_3 & c_3 \end{vmatrix} = \begin{vmatrix} a_1 + l_1 & b_1 & c_1 \\ a_2 + l_2 & b_2 & c_2 \\ a_3 + l_3 & b_3 & c_3 \end{vmatrix}$$

Properties of Determinants:-

(1) $If\ the\ rows\ \&\ columns\ are\ interchanged\ then\ the\ value\ of\ the\ determinant\ remains\ same.$

(2) $If\ two\ associated\ rows\ (or\ columns)\ are\ interchanged\ then\ the\ sign\ will\ be\ changed.$

(3) $If\ there\ are\ two\ rows\ (or\ columns)\ are\ identical, then\ the\ value\ will\ be\ zero.$

(4) $If\ each\ element\ of\ a\ row\ (or\ a\ column)\ of\ a\ determinant\ is\ multiplied\ by\ a\ constant\ k\ then$ $the\ value\ of\ new\ determinant\ is\ k\ times\ the\ value\ of\ original\ determinant.$

(5) $If\ all\ the\ elements\ in\ a\ row\ (or\ column)\ are\ zero, then\ the\ value\ will\ be\ zero.$

Multiplication of Determinants:-

$$\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} \begin{vmatrix} p_1 & q_1 \\ p_2 & q_2 \end{vmatrix} = \begin{vmatrix} a_1p_1 + b_1q_1 & a_1p_2 + b_1q_2 \\ a_2p_1 + b_2q_1 & a_2p_2 + b_2q_2 \end{vmatrix} \qquad (R \times R)$$

To find the area of a triangle:-

$$Area\ of\ \Delta ABC = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}\ sq.units$$

Cramer's Rule:-

$Let, a_1x + b_1y + c_1z = k_1$

$a_2x + b_2y + c_2z = k_2$

$a_3x + b_3y + c_3z = k_3$

$Using\ cramer's\ rule,\qquad x = \frac{D_1}{D}, y = \frac{D_2}{D}, z = \frac{D_3}{D}$