# Практика 5 ДМ

$(x-2)^7 = C_7^0 x^7 (-2)^0 + C_7^1 x^6 (-2)^1 + C_7^2 x^5 (-2)^2 + C_7^3 x^4 (-2)^3 + C_7^4 x^3 (-2)^4 + C_7^5 x^2 (-2)^5 + \\ + C_7^6 x^1 (-2)^6 + C_7^7 x^0 (-2)^7 = x^7 - 14x^6 + 84x^5 - 280x^4 + 560x^3 - 672x^2 + 448x - 128$

$\left(\frac{1}{\sqrt{3x}} - 2x\right)^n$

Коэффициент третьего элемента равен 105

Найти двенадцатый элемент

$C_n^2 = 105 = \frac{n!}{2!(n-2)!} \quad n = 15$

$C_{15}^{11} = \frac{15!}{11!4!} = 105 \cdot 13 = 1365$

$a_{12} = 1365 \cdot \left(\frac{1}{\sqrt{3x}}\right)^4 \cdot (-2x)^{11} = -\frac{931840x^9}{3}$

$C_{16}^{n-1} z^n \left(\frac{1}{z^3}\right)^{16-n} = \frac{16!}{(n-1)!(17-n)!} \cdot z^n \cdot \left(\frac{1}{z^3}\right)^{16} \cdot z^{3n}$

$(x+y+z)^3 = C_3^0 (x+y)^3 + C_3^1 (x+y)^2 z + C_3^2 (x+y) z^2 + C_3^3 z^3 = \\ = x^3 + 3x^2 y + 3xy^2 + y^3 + 3(x^2 + 2xyz + y^2 z) + 3(z^2 x + yz^2) + z^3$

$(x+y+z)^9 = \sum_{i=0}^{9} C_9^i (x+y)^{9-i} \cdot z^i$

Подробная запись:

$$\begin{aligned}(x+y+z)^9 = {} & x^9 + y^9 + z^9 \\ & + 9\,(x^8 y + x^8 z + x y^8 + x z^8 + y^8 z + y z^8) \\ & + 36\,(x^7 y^2 + x^7 z^2 + x^2 y^7 + x^2 z^7 + y^7 z^2 + y^2 z^7) \\ & + 84\,(x^7 y z + x y^7 z + x y z^7) \\ & + 126\,(x^6 y^3 + x^6 z^3 + x^3 y^6 + x^3 z^6 + y^6 z^3 + y^3 z^6) \\ & + 252\,(x^6 y^2 z + x^6 y z^2 + x^2 y^6 z + x^2 y z^6 + x y^6 z^2 + x y^2 z^6) \\ & + 504\,(x^5 y^4 + x^5 z^4 + x^4 y^5 + x^4 z^5 + y^5 z^4 + y^4 z^5) \\ & + 630\,(x^5 y^3 z + x^5 y z^3 + x^3 y^5 z + x^3 y z^5 + x y^5 z^3 + x y^3 z^5) \\ & + 756\,(x^5 y^2 z^2 + x^2 y^5 z^2 + x^2 y^2 z^5) \\ & + 1260\,(x^4 y^3 z^2 + x^4 y^2 z^3 + x^3 y^4 z^2 + x^3 y^2 z^4 + x^2 y^4 z^3 + x^2 y^3 z^4) \\ & + 1680\,x^3 y^3 z^3\end{aligned}$$