Nishant Jindal

Formation of Groups

Number of ways to divide '$m+n$' $(m \neq n)$ distinct objects into 2 groups containing m, n objects.

$$= {}^{m+n}C_m = \frac{(m+n)!}{m!\,n!}$$

B_1	B_2
$c_1 \dots c_5$	$c_6c_7c_8$
$c_6c_7c_8$	$c_1c_2c_3c_4c_5$

$m+n \rightarrow m,\ n$

$$112 = 2 \times 56 = \frac{8!}{5!\,3!} \times 2! \checkmark =$$

(2) Find no. of ways to distribute 8 different brand choc. among 2 boys so that the one boy get 5 and the other get 3.

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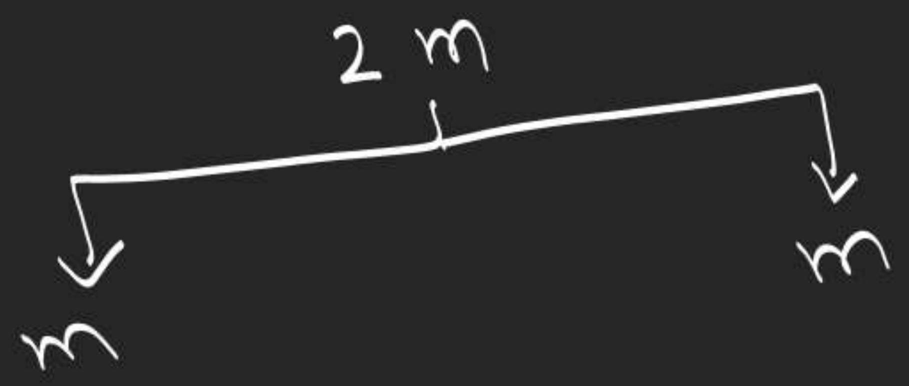
No. of ways to Divide '2m' distinct objects equally into 2 groups

$$= \frac{(2m)!}{(m!)\, m!\, 2!}$$



$T_1 T_2 \cdots T_m$	$T_{m+1} T_{m+2} \cdots T_{2m}$
$T_{m+1} T_{m+2} \cdots T_{2m}$	$T_1 T_2 \cdots T_m$

$$\frac{{}^{2m}C_m}{2!}$$

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To Divide 'm+n+p' distinct objects into 3 groups. $\begin{cases} m \\ n \\ p \end{cases}$

m, n, p are all distinct.

$$= {}^{m+n+p}C_m \times {}^{n+p}C_n = \boxed{\frac{(m+n+p)!}{m!\,n!\,p!}}$$

$T_{n+p+1}\ T_{n+p+2} \cdots T_{n+p+m}$

$$m+n+p \begin{cases} m \\ n+p \to T_1, T_2, \cdots T_{n+p} \begin{cases} n \\ p \end{cases} \quad {}^{n+p}C_n \checkmark \end{cases}$$

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$m+n+p$ — m ($T_1 \cdots T_m$), $n+p$

$n+p$ — n, p

$T_{m+1} \cdots T_{m+n+p}$

$$\frac{(m+n+p)!}{2!\,m!\,(n+p)!} \times \frac{(n+p)!}{n!\,p!} \times 2$$

$m = n+p$

$$\frac{(n+p)!}{n!\,p!} \times 2$$

10 — 5, 3, 2

10 — 2, 8; 8 — 5, 3

10 — 5, 5; 5 — 3, 2; 5 — 3, 2

$m+n+p$ — n, $m+p$

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$(m_1 + m_2 + m_3 + \cdots + m_n)$ distinct objects

m_1

m_2

m_3

$\vdots$

m_n

m_i all distinct

$$= \frac{(m_1 + m_2 + m_3 + \cdots + m_n)!}{(m_1)!\,(m_2)!\,(m_3)! \cdots (m_n)!}$$

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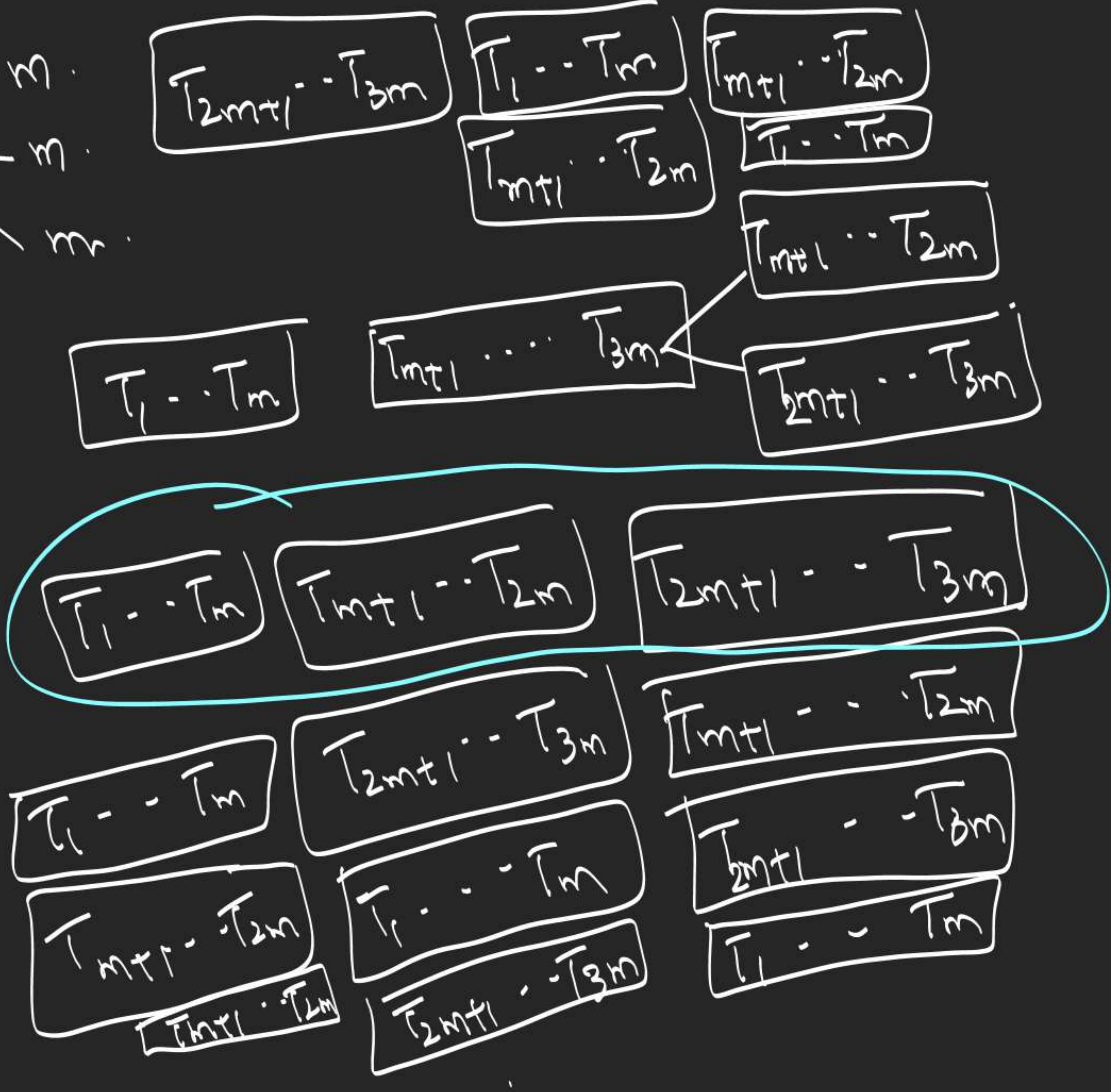
'3m' distinct objects to be divided into 3 equal groups.

$3m \to m,\ m,\ m$



$3m \to m,\ 2m$; $2m \to m,\ m$

$$\boxed{\frac{(3m)!}{m!\,m!\,m!\,3!}}$$

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10 distinct objects

2 ✓

2 ✓

3 ✓

3 ✓

$$\frac{10!}{2!\,2!\,3!\,3!\,2!\,2!}$$

$T_1 T_2$

$T_3 T_4$

$T_5 T_6 T_7$

$T_8 T_9 T_{10}$

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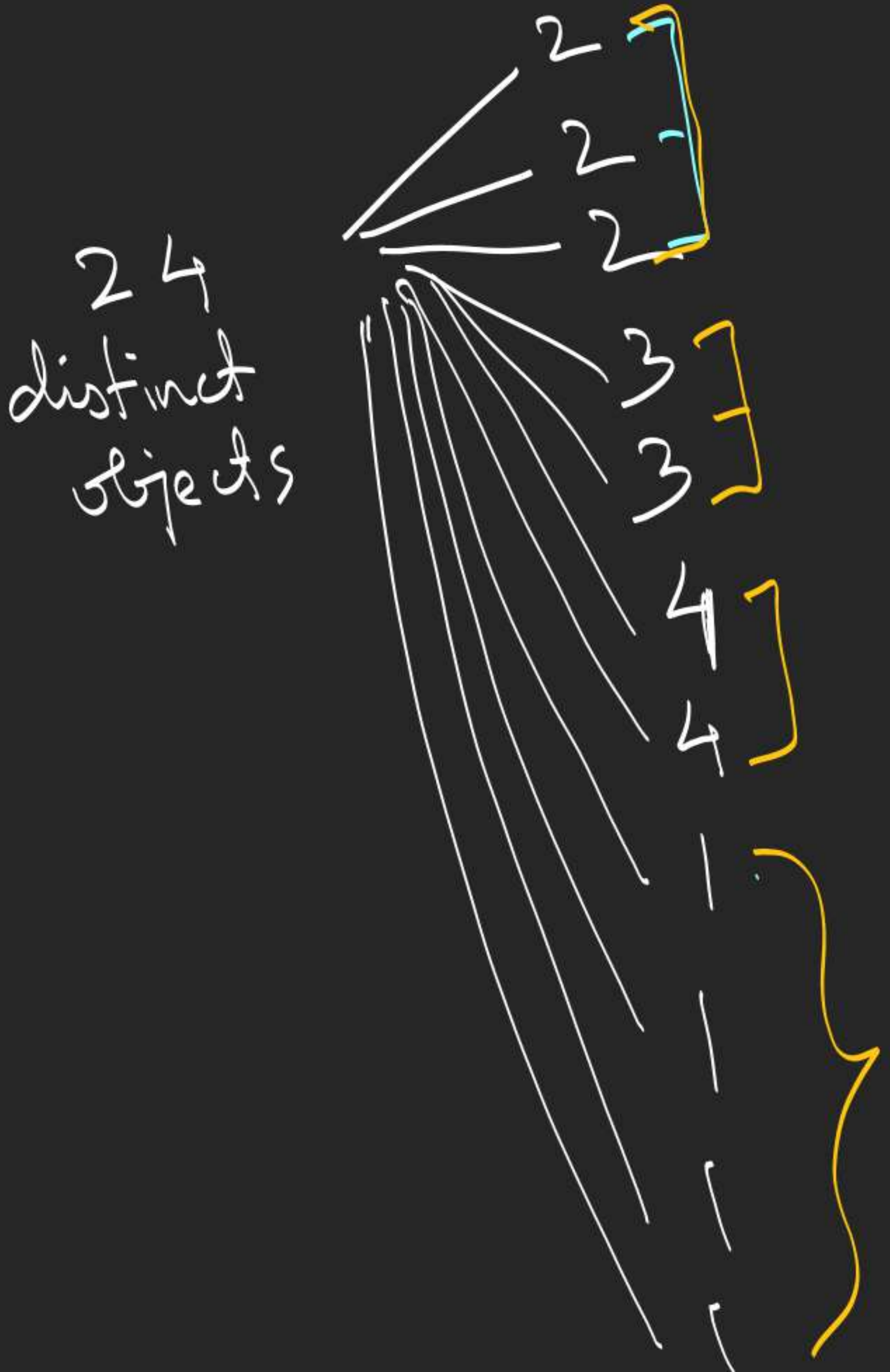

$$\frac{(24)!}{(2!)^3(3!)^2(4!)^2(1!)^4\,3!\,2!\,2!\,4!}$$

P&C $\rightarrow$ DPP-1

SC $\rightarrow$ 41-45