Class 21

Sunday, January 10, 2021 9:47 PM

$\boxed{{}^nC_r} \rightarrow \binom{n}{r} \rightarrow$

1 2 3 4 5

$\downarrow$

2

1 2
1 3
1 4
1 5
2 3
2 4
2 5
3 4
3 5
4 5

$\binom{5}{2} = 10$

$n = 5$

$r = 2$

$\binom{n}{r} = \frac{n!}{r!\,(n-r)!}$

$\binom{n}{r} = \frac{n!}{r!\,(n-r)!}$

$n = 5500$

$r = 2341$

$\boxed{\frac{5500!}{2341!\,(5500-2341)!}}$

$= X \,\%\, MOD$

$= 10^{12345} \,\%\, 1000$

$[0, 999]$

$\rightarrow 1 \rightarrow 1$ (${}^0C_0$)

$\rightarrow 1 \quad 1 \rightarrow 2$ (${}^1C_0$, ${}^1C_1$)

$\rightarrow 1 \quad 2 \quad 1 \rightarrow 4$

$\rightarrow 1 \quad 3 \quad 3 \quad 1 \rightarrow 8$

$\rightarrow 1 \quad 4 \quad 6 \quad 4 \quad 1 \rightarrow 16$ (${}^4C_0$, ${}^4C_1$, ${}^4C_2$, ${}^4C_3$, ${}^4C_4$)

$\rightarrow 1 \quad 5 \quad 10 \quad 10 \quad 5 \quad 1 \rightarrow 32$ (${}^5C_0$, ${}^5C_1$, ${}^5C_2$, ${}^5C_3$, ${}^5C_4$, ${}^5C_5$)

${}^nC_r$

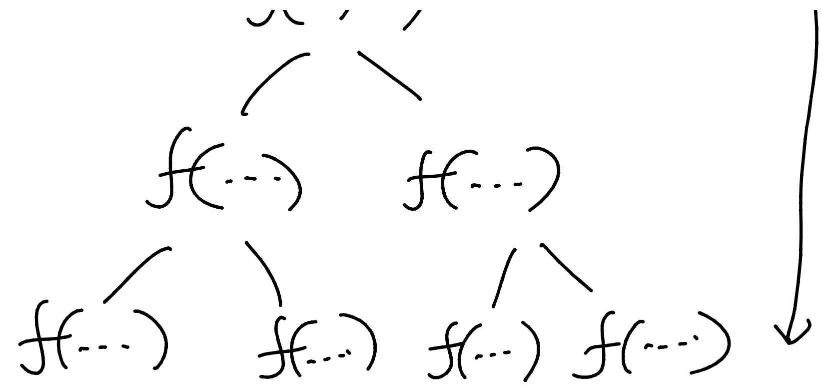
$\boxed{{}^nC_r = {}^{n-1}C_{r-1} + {}^{n-1}C_r}$

${}^5C_3 = {}^4C_2 + {}^4C_3$

$2^5 = 32$

$f(n,r) = f(n-1, r-1) + f(n-1, r)$

$f(n,r)$



$n \to 2^n$

$$\boxed{O(n) \longrightarrow {}^{n}C_{r}}$$

$$O(2^n) \longrightarrow O(n^2)$$

— o —

$$\binom{n}{r} = \frac{n!}{r!\,(n-r)!} = \binom{10}{7} = \frac{10!}{7! \times (10-7)!}$$

$$= \frac{10!}{7!\,3!} = \frac{10 \times 9 \times 8 \times \cancel{7!}}{\cancel{7!}\,3!}$$

$$= 120 \qquad = \boxed{\frac{10 \times 9 \times 8}{1 \times 2 \times 3}}$$

$$\binom{10}{7} = \frac{10 \times 9 \times 8}{1 \times 2 \times 3} = 120$$

$$\binom{103}{97} = \frac{103 \times 102 \times 101 \times 100 \times 99 \times 98}{1 \times 2 \times 3 \times 4 \times 5 \times 6}$$

$$\binom{11}{6} = \frac{11 \times 10 \times 9 \times 8 \times 7}{1 \times 2 \times 3 \times 4 \times 5}$$

— o —

$$\sum^{n} \binom{n}{i} = \binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \binom{n}{3} + \dots + \binom{n}{n} = 2^n$$

$$\sum_{i=0} \binom{n}{i} = \binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \binom{n}{3} + \dots + \binom{n}{n} = 2$$

$$3 \rightarrow \{\ \} \longrightarrow \binom{3}{0} +$$

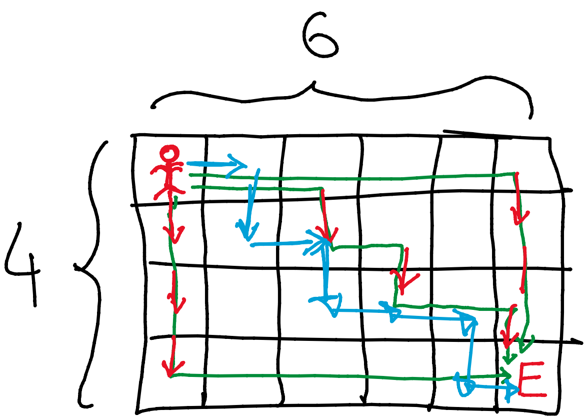
$$\{1\}, \{2\}, \{3\} \longrightarrow \binom{3}{1} +$$

$$\{1,2\}, \{1,3\}, \{2,3\} \longrightarrow \binom{3}{2} +$$

$$\{1,2,3\} \longrightarrow \binom{3}{3}$$

$$2^3$$

—o—



D move এর count → 3

R move এর count → 5

$$\boxed{RDRDRRDR}$$

$3+5 \rightarrow 8$

$$\frac{8!}{3!\,5!} \rightarrow \boxed{\frac{(n+m-2)!}{(m-1)!\,(n-1)!}}$$

RRD

RDR

DRR

$$\frac{3!}{2!} = 3$$

$$\binom{8}{3} = \binom{8}{5} = \frac{8!}{5!\,3!}$$

$$\rightarrow \binom{n+m-2}{n-1} = \binom{n+m-2}{m-1}$$

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