

Pascal Triangle

3 Types of problem change be asked

① We will be given a r and c and we have to return that row and col. no. ~~of~~.

→ It can be solved by just formula of ${}^nC_r = \frac{n!}{r!(n-r)!}$

when $n = r-1$

$r = c-1$

${}^{r-1}C_{c-1}$

We can optimised the formula.

$${}^nC_r = \frac{n!}{r! (n-r)!}$$

let say, 5C_2

$$\frac{5!}{\textcircled{2}! (5-2)!}$$

↓

$$3!$$

Which we have to not
multiple $5 \times 4 \times 3 \dots$
till $(5-2)$

$$\left(\frac{5}{2} \times \frac{4}{1} \right)$$

↓

$$\frac{5}{2} \times \frac{4}{1}$$

This

$5-1 = 4$
 $5-2 = 3$
 $n-i$

$$= \frac{5 \times 4 \times \cancel{(3 \times 2 \times 1)}}{2 \times 1 \times \cancel{3!}}$$

↓

Pseudocode:

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$nCr(n, r)$
ans = 1

for ($i = 1; i \leq r; i++$)

ans = ans * $(n - i + 1)$

ans = ans / (i)

~~50~~

5 * 0

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

i + 1

2nd Types of problems

We have to print entire row n given row no.

Brute force:

we can iterate ~~for~~ till n

and for every n , i

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for ( i = 0; i < n; i++)  
    cout << mCr(n, i),
```

0, 1, 2, 3, 4
↓
 m_{C_0} m_{C_1} m_{C_2} m_{C_3}

| | 1 | 2 | 3 | 4 | 5 | 1 |
|----------|----------|---------------|---------------------------------|---|---|----------|
| <u>6</u> | <u>1</u> | 5 | 10 | 10 | 5 | <u>1</u> |
| ans = | 1 | $\frac{5}{1}$ | $\frac{5 \times 4}{1 \times 2}$ | $\frac{5 \times 4 \times 3}{1 \times 2 \times 3}$ | | |
| | 0 | 1 | 2 | 3 | 4 | 5 |

$$\text{ans} = \text{ans} \times \frac{\text{row-col}}{1} \quad N-6$$

$$\text{ans} = \underline{\underline{1}}$$

for (i=1; i<n; i++)

$$\text{ans} = \text{ans} \times (n-i) \left(\frac{n-i}{i} \right) \text{ans}$$

$$\text{ans} = \text{ans} / i$$

Q. Print Pascal Triangle:

Brute $O(N^3)$

Optimal $\rightarrow O(N^2)$ \rightarrow we use type 2 of code

