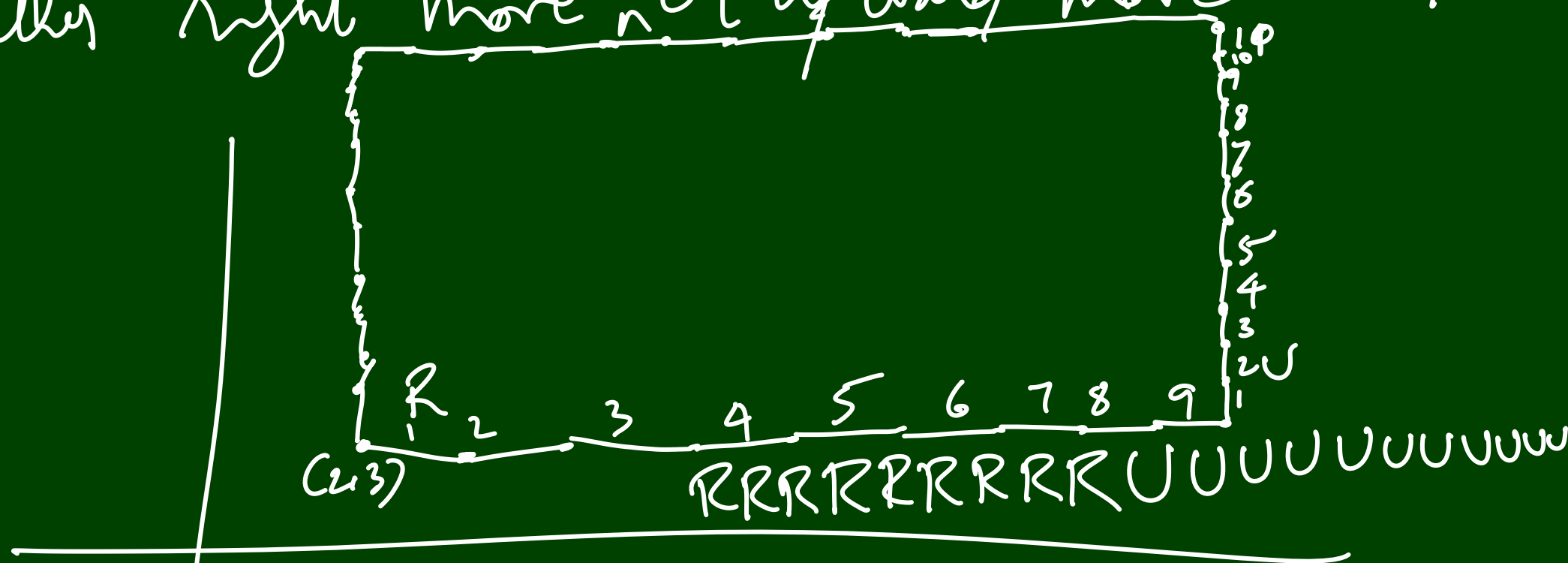


19/11/21 Friday

How many different paths are there from  $(2, 3)$  to  $(11, 14)$  if each path consists of either right <sup>one step</sup> move or upward move <sup>one step</sup>?



$$\frac{1n}{1n_1 1n_2 \dots 1n_k}$$

$$\frac{120}{?}$$

$$\frac{19!}{1! 1!} = \frac{19 \times 18 \times 17 \times 16 \times 15 \times 14 \times 13 \times 12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{1 \times 1} = 8840 \times 19$$

$$\frac{22!}{2!} = 8840$$

$$= 167960$$

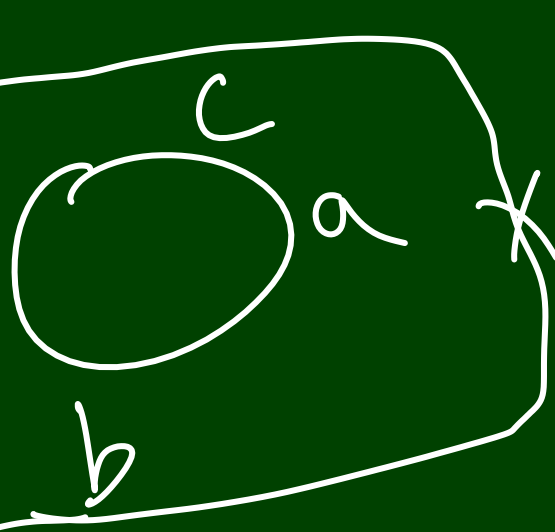
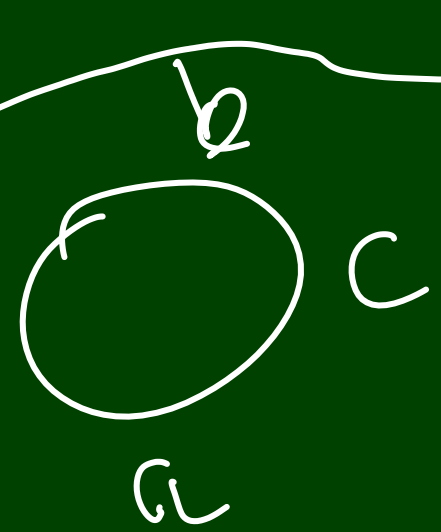
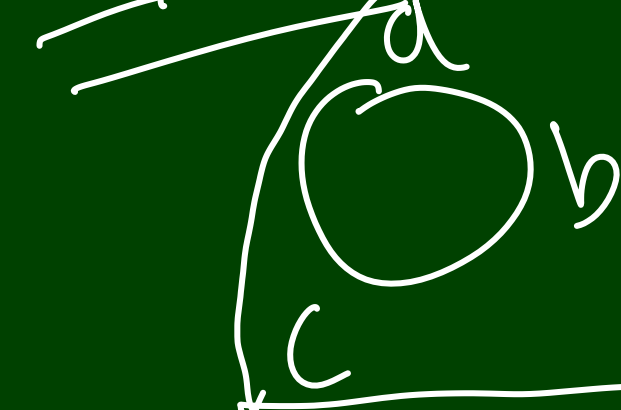
$(x_1, y_1)$  to  $(x_2, y_2)$

$$\frac{|x_2 - x_1| + |y_2 - y_1|}{|x_2 - x_1| |y_2 - y_1|}$$

$(2, 3)$   $(11, 14)$

$$\frac{|(11-2) + (14-3)|}{|11-2| + |14-3|}$$

a, b, c

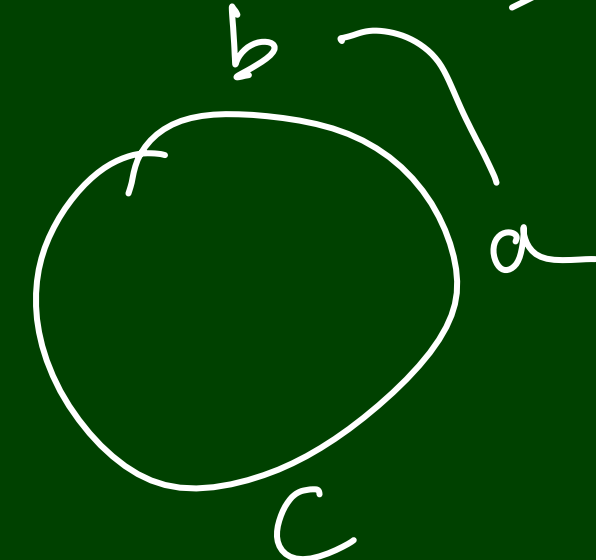
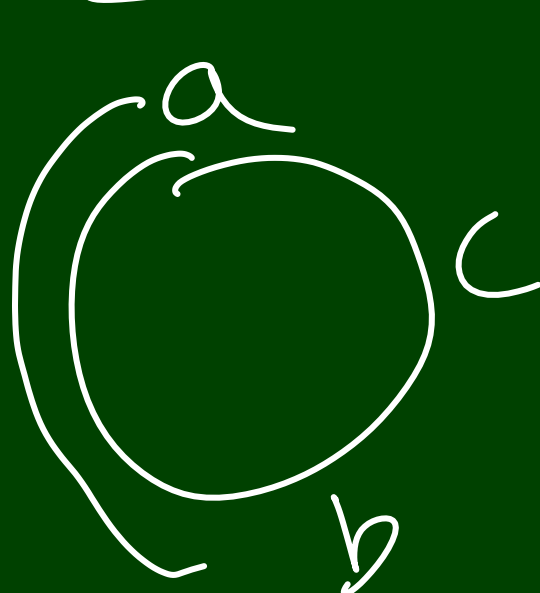


- abc ✓
- acb ✓
- bac ✓
- bca ✓
- cab ✓
- cba ✓

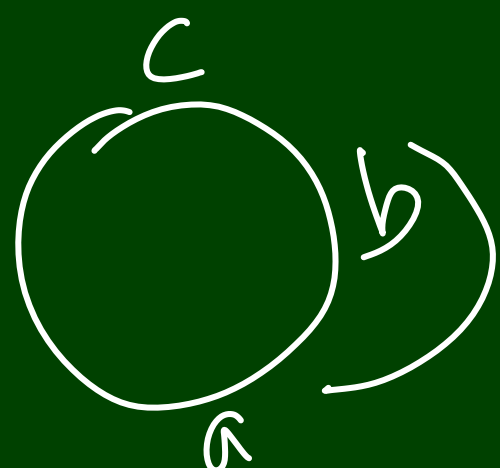
$$(n-1) \times$$

$$(n-1) ?$$

$$\frac{2! 2!}{3! 2! 1!} = \frac{2! 2!}{3!}$$



$$(2)$$



$a, b, c, d$        $4P_4$        $\overline{4|3|2|1}$   
 $\checkmark a b c d$        ~~$b a c d$~~        ~~$c a b d$~~        ~~$d a b c$~~   
 $\checkmark a b d c$        ~~$b a d c$~~        ~~$c a d b$~~        ~~$d a c b$~~   
 $\checkmark a c b d$        ~~$b c a d$~~        ~~$c b a d$~~        ~~$d b a c$~~   
 $\checkmark a c d b$        ~~$b c d a$~~        ~~$c b d a$~~        ~~$d b c a$~~   
 $\checkmark a d b c$        ~~$b d a c$~~        ~~$c d a b$~~        ~~$d c a b$~~   
 $\checkmark a d c b$        ~~$b d c a$~~        ~~$c d b a$~~        ~~$d c b a$~~

4

$$\frac{1^3}{1(n-1)}$$

$$\frac{1^{n-1}}{2}$$

Combination :-  $a b c$        $\overline{a b b a}$   
 $\overline{a c c a}$   
 $\overline{b c c b}$

The no. of ways selecting

$r$  objects from a set of  $n$  objects is  $nCr$

$$nC_1 = \frac{n}{1(n-1)}$$

$$nC_0 = 1 = nC_n \quad nC_1 = n = nC_{n-1}$$

$$nC_r = nC_{n-r}$$

$$nC_r = \frac{n(n-1)(n-2)\dots(n-(r-1))}{1^r}$$

PASCAL'S TRIANGLE

$1$   
 $1 \ 1$   
 $1 \ 2 \ 1$   
 $1 \ 3 \ 3 \ 1$   
 $1 \ 4 \ 6 \ 4 \ 1$   
 $1 \ 5 \ 10 \ 10 \ 5 \ 1$

① In how many ways one can select 3 white balls and 2 red balls from a bag containing 10 white balls and 7 red balls?

Sol :-

$$\overline{10W \ 7R} \quad \begin{matrix} 3W \\ 2R \end{matrix}$$

$$10C_3 \times 7C_2 = \frac{10 \times 9 \times 8}{1 \times 2 \times 3} \times \frac{7 \times 6}{1 \times 2}$$

$$= \frac{6 \times 7 \times 8 \times 9 \times 10}{1 \times 2 \times 3 \times 1 \times 2}$$

$$= 2520$$

2

10W  
7R

4 balls

W

R

$$10C_4 \times 7C_6 \leftarrow 4$$

0

$$+ 10C_3 \times 7C_7 \leftarrow 3$$

1

$$+ 10C_2 \times 7C_8 \leftarrow 2$$

2

$$+ 10C_1 \times 7C_9 \leftarrow 1$$

3

$$+ 10C_0 \times 7C_{10} \leftarrow 0$$

4

$$= \frac{10 \times 9 \times 8 \times 7}{1 \times 2 \times 3 \times 4} \times 1 + \frac{10 \times 9 \times 8}{1 \times 2 \times 3} \times 7$$

$$+ \frac{10 \times 9}{1 \times 2} \times \frac{7 \times 6}{1 \times 2} + 10 \times \frac{7 \times 6 \times 5}{1 \times 2 \times 3}$$

$$+ 1 \times \frac{7 \times 6 \times 5 \times 4}{1 \times 2 \times 3 \times 4}$$

$$= 210 + 840 + 945 + 350 + 35$$

$$= 2380$$

6 cookies

$C_1$   $C_2$   $C_3$