$$\prod_{i=1}^{3} i = 1 \cdot 2 \cdot 3 = 6$$

$$\prod_{i=3}^{1} i = \prod_{i \in \emptyset} i = 1$$

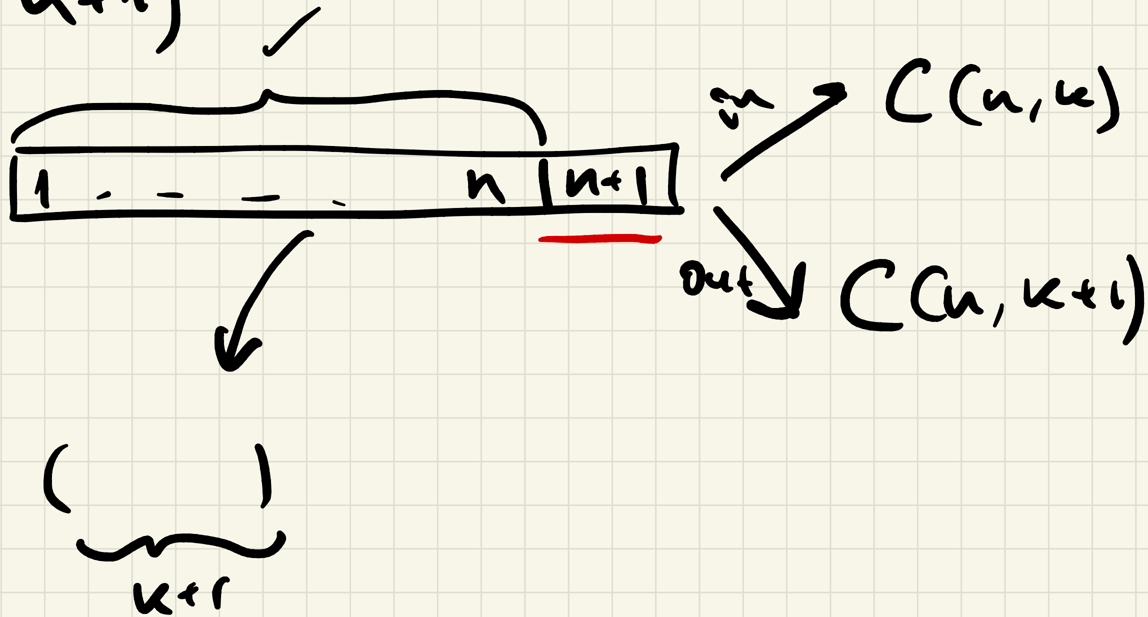
$$0! = 1$$

$$\prod_{i=m}^{n}$$

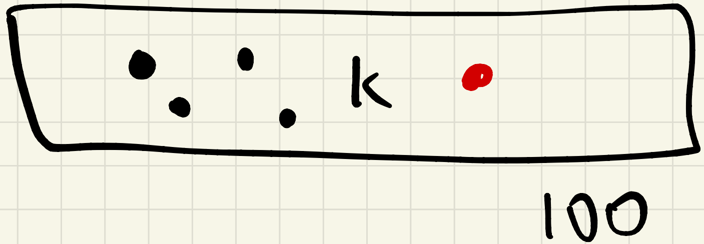
$C(n,k)$

$(a+b)^9 = a^9 + \ldots$

$C(n+1, k+1)$



$$C(n+1, k+1) = C(n,k) + C(n, k+1)$$



$K=1$

$K=5$

$\downarrow 5$

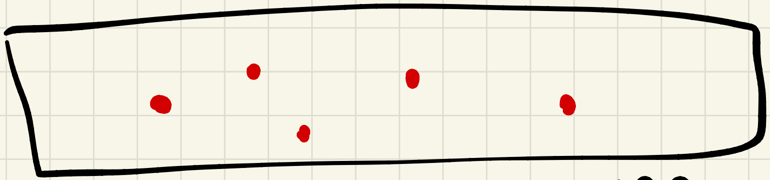
$a = C(100,5) = \dfrac{100!}{5!\,95!}$

$b = C(99,4) \quad \dfrac{99!}{4!\,95!}$

$P = \dfrac{b}{a}$

$$\frac{99!}{4!\,95!} \div \frac{100!}{5!\,95!} = \frac{99!\ \overset{5}{\cancel{5!}}\ \cancel{95!}}{\cancel{4!}\ \cancel{95!}\ 100!}$$

$$= \frac{5}{100} = \frac{1}{20} = 0.05$$



95

100

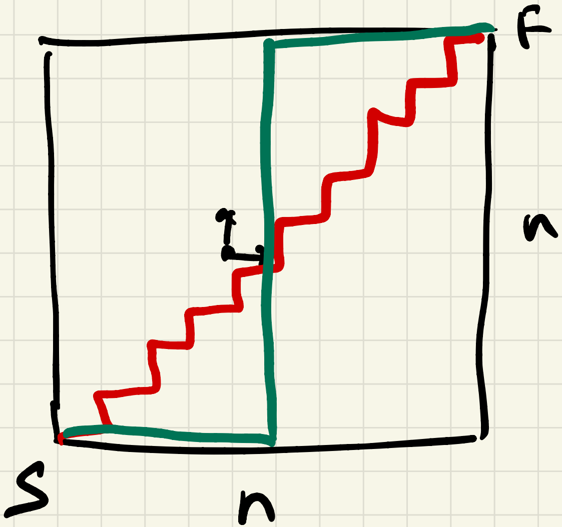
$$C(95,5) = \frac{95!}{5!\,90!}$$

$91\cdot 92\cdot 93\cdot 94\cdot 95$

$$\frac{95!}{5!\,90!} \div \frac{100!}{5!\,95!} = \frac{\cancel{95!}\cdot \cancel{5!}\;95!}{\cancel{5!}\;\cancel{90!}\;\cancel{100!}}$$

$96\cdot 97\cdot 98\cdot 99\cdot 100$

$1 - \underline{\qquad\qquad}$



$$\frac{2(n+1)}{2} = 2\,\frac{n+1}{2} > 2\cdot 1$$

$$\frac{2(n+2)}{2} = 2\,\frac{n+2}{2} > 2\cdot 2$$

$$\frac{2(n+3)}{2} = 2\,\frac{n+3}{2} > 2\cdot 3$$

$$\underbrace{(r, u, r, u, r, u \,-\,-)}_{2n}$$

n - ups

n - rights

$$C(2n, n) = \frac{2n!}{n!\,n!} = \frac{\cancel{1\cdot 2\cdot \ldots}\, n\cdot(n+1)\cdot(n+2)\ldots 2n}{\cancel{1\cdot 2\cdot 3\ldots n}\cdot n!}$$

$$\frac{n+k}{2} > \frac{2k}{2} = k \qquad n > k$$

$$C(2n, n) > \frac{2\cdot\cancel{1}\cdot 2\cdot\cancel{2}\cdot 2\cdot\cancel{3}\cdot \ldots\ 2\cdot\cancel{n}}{\cancel{1}\cdot\cancel{2}\cdot\cancel{3}\cdot\ldots\cdot\cancel{n}} = 2^n$$

$$10 = 1+1+8 = 2+2+6 = 1+5+4 = \dots$$

$$\underbrace{||+||+||||||}_{12}$$

$$C(10,2) - 9$$

$$|++|\dots|$$

$$||++\dots|$$

$$\vdots$$

$$|||||++|$$