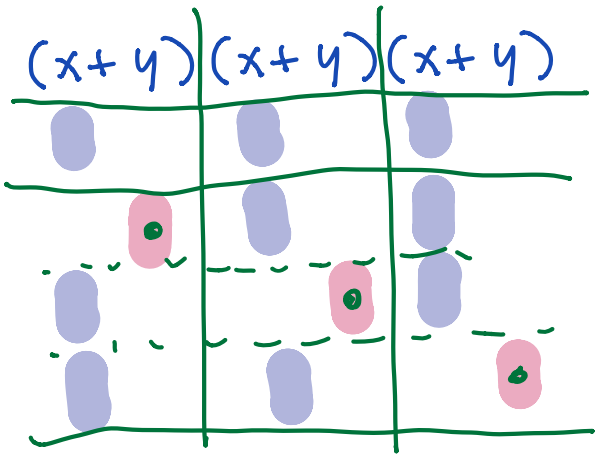
Jan 14 Thurs

$(x+y)^0 = 1$

$(x+y)^1 = x+y$

$(x+y)^2 = x^2+2xy+y^2$

$(x+y)^3 = x^3+3x^2y+3xy^2+y^3$

$(x+y)^3 =$ 

x^3

x^2y

$\binom{3}{1}x^2y$

$$(x+y)^n = \binom{n}{0}x^n + \binom{n}{1}x^{n-1}y + \binom{n}{2}x^{n-2}y^2 + \dots \binom{n}{n}y^n$$

$\binom{n}{0} = 1$ $\quad$ $\binom{n}{1} = n$ $\quad$ binomial theorem

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

1 !

$1-1=0$

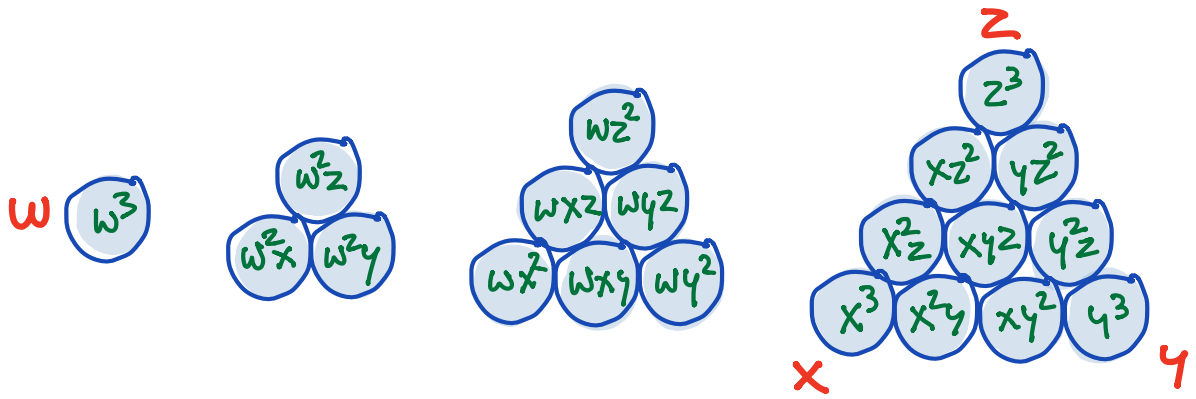
$1-2+1=0$

$1-3+3-1=0$

$1-4+6-4+1$

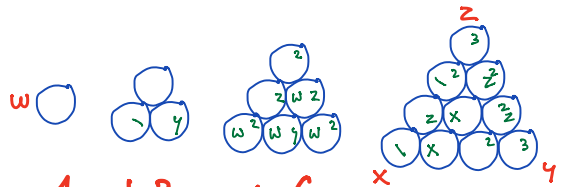
$(x+y)^n$ $\quad$ $x=y=1$ $\quad$ $2^n = \binom{n}{0}+\binom{n}{1}+\binom{n}{2}+\dots+\binom{n}{n}$

$x=1, y=-1$ $\quad$ $0 = \binom{n}{0}-\binom{n}{1}+\binom{n}{2}-\dots\pm\binom{n}{n}$



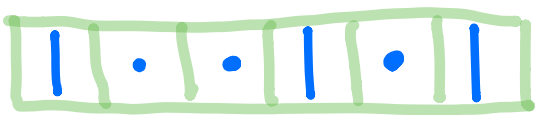
monomials of deg 3 in 4 variables w, x, y, z

d n $\binom{n-1+d}{d}$ $\binom{6}{3}$ ✓



1 +3 +6 +10 = 20 ✓ monomials

x^2y ↔ | • | • | | • | ↔ w x y z



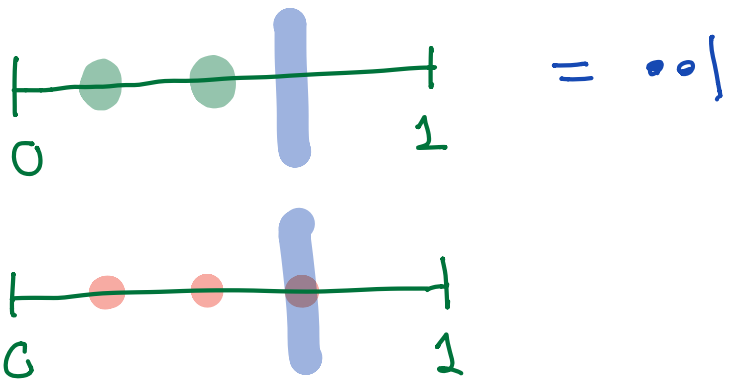
$\binom{6}{3} = \frac{6 \cdot 5 \cdot 4}{3 \cdot 2 \cdot 1} = 20$ ✓

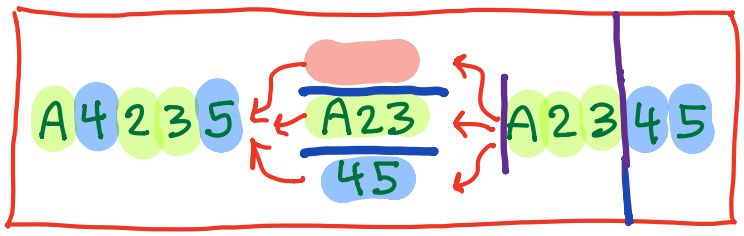
Jerry Tersoff

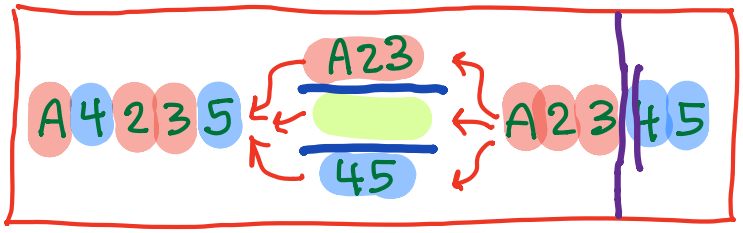
AB|	1/4
A|B	1/2
B|A	
|AB	1/4

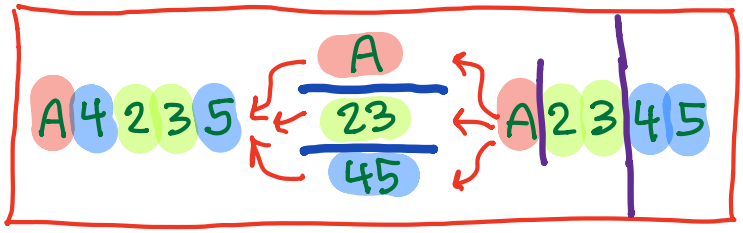
Bose-Einstein

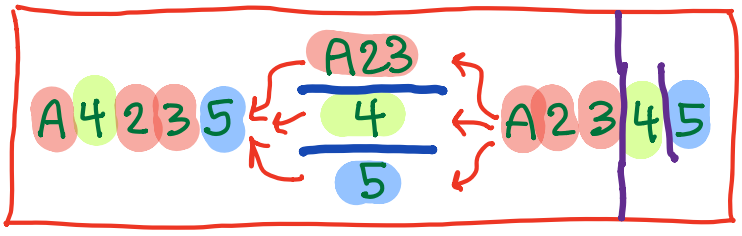
••|	1/3
•|•	1/3
|••	1/3

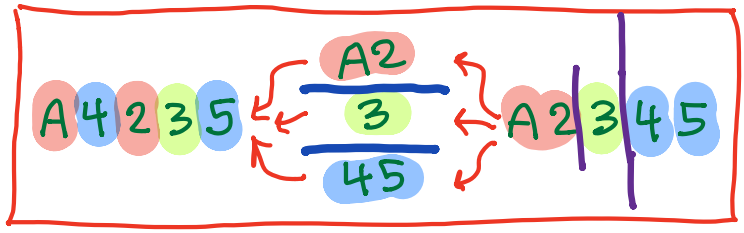


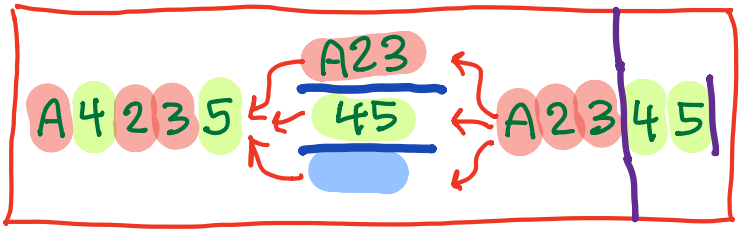


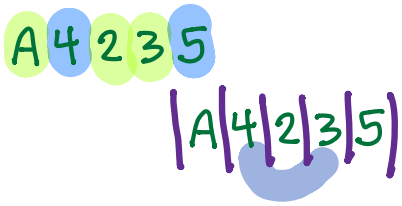




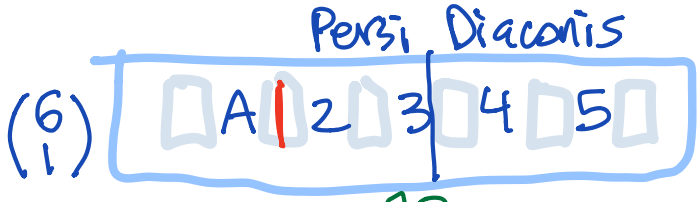


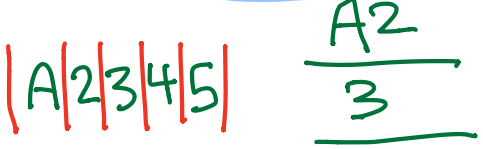


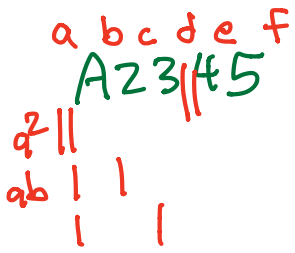


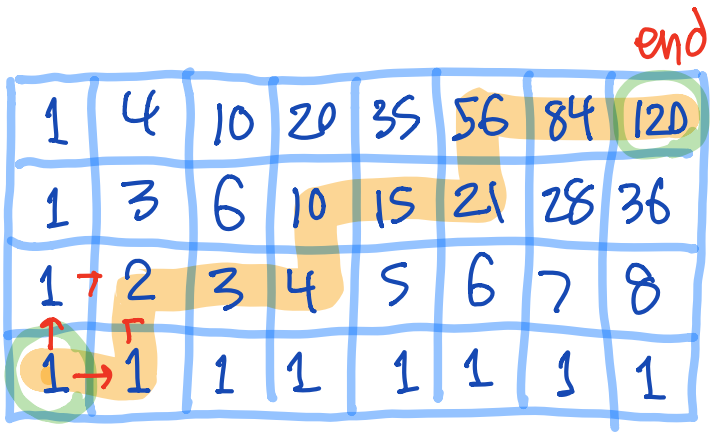


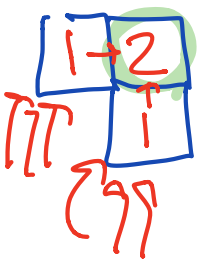
Persi Diaconis

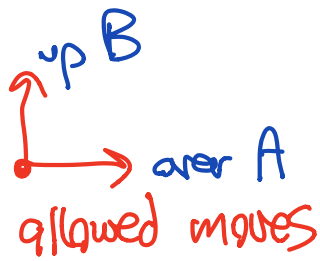


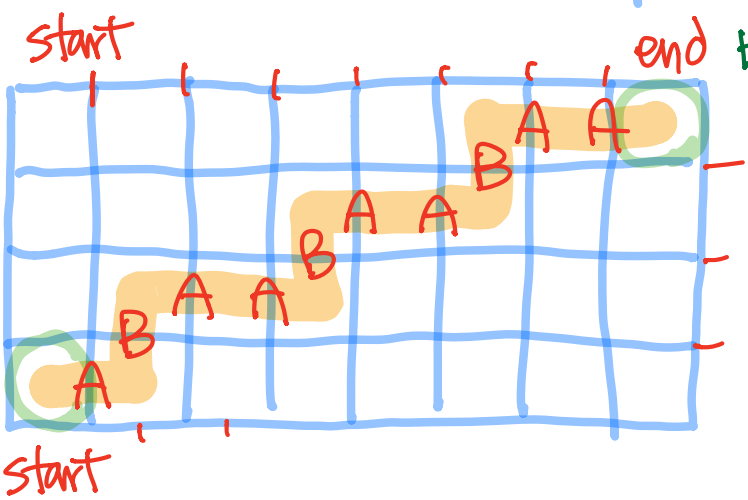












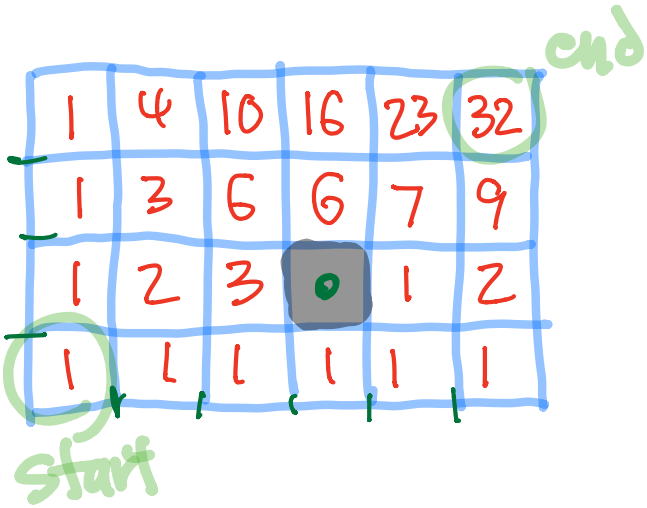
How many paths start to end

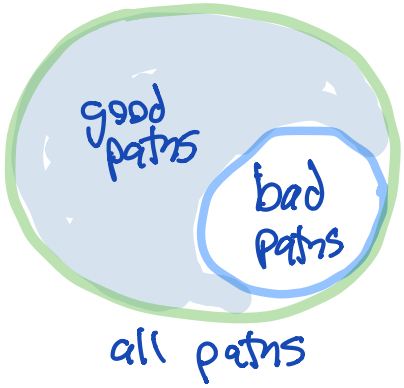
7 As 3 Bs 10 all

ABAABAABAA

$\binom{10}{3} = \frac{10 \cdot 9 \cdot 8}{3 \cdot 2 \cdot 1} = 120$ ✓

Inclusion-Exclusion





all - bad = good

$$\binom{8}{3} - \binom{4}{1}\binom{4}{2}$$

$$\frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} - \frac{4 \cdot 4^{2} \cdot 3}{1 \quad 2}$$

$$56 - 24 = 32$$

✓