

Coeficientes Binomiais

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

NÚMERO DE COMBINAÇÕES DE k ELEMENTOS A PARTIR DE UM CONJUNTO DE n ELEMENTOS

1



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

$$\binom{n}{k} = \binom{n}{n-k}$$

2

FORMULA DO BINÔMIO DE NEWTON

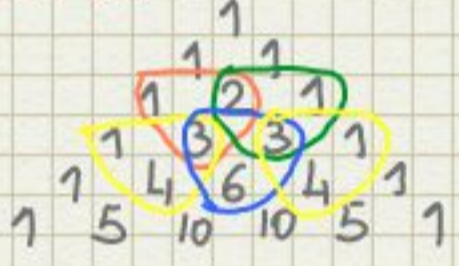
$$(a+b)^m = \sum_{k=0}^m \binom{m}{k} a^{m-k} b^k$$

$$(a+b) \underset{1}{(a+b)} \dots \underset{m}{(a+b)}$$

$$C_{m,0} a^m b^0 \mid C_{m,1} a^{m-1} b^1 \mid \dots \mid C_{m,m-1} a^1 b^{m-1} \mid C_{m,m} a^0 b^m$$



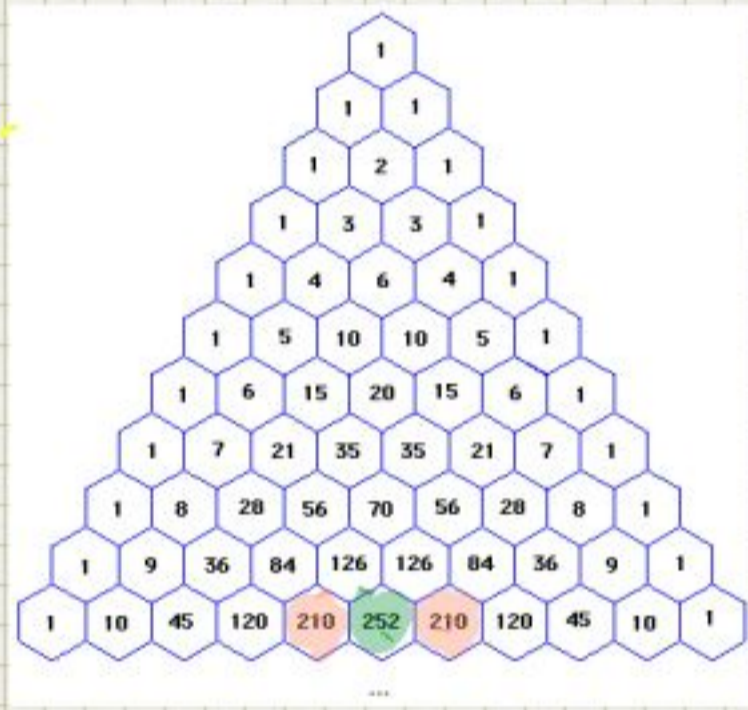
TRIÂNGULO DE TARTAGLIA



CLARAMENTE MAIS RÁPIDA A FORMULA DE NEWTON

$$\binom{10}{4} = \binom{10}{6} = \frac{10!}{4!6!} = \frac{10 \cdot 9 \cdot 8 \cdot 7}{4 \cdot 3 \cdot 2} = 210$$

$$\binom{10}{5} = \frac{10!}{5!5!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{5 \cdot 4 \cdot 3 \cdot 2} = 252$$



3

$$\binom{m}{k+1} = \binom{m}{k} \frac{m-k}{k+1}$$

$$\frac{m!}{(k+1)!(m-k-1)!} = \frac{m!}{(k+1)k!(m-k)(m-k-1)!} = \frac{m!}{k!(m-k)!} \cdot \frac{m-k}{k+1} \quad \text{OK!}$$

4

$$\sum_{k=0}^m k \binom{m}{k} = 1048576$$

CALCULAR m

FORMULA DO BINÔMIO DE NEWTON PAR $a=b=1$

$$(1+1)^m = \sum_{k=0}^m k \binom{m}{k} 1^{m-k} 1^k = 1048576$$

$$2^m = 1048576 \Rightarrow m \log 2 = \log 1048576$$

$$m = 20$$

5

RELAÇÃO DE STIFEL

$$\binom{m-1}{k-1} + \binom{m-1}{k} = \binom{m}{k}$$

$$\frac{(m-1)!}{k!(m-k)!} k + \frac{(m-1)!}{k!(m-k)!} (m-k) = \frac{m!}{k!(m-k)!} \quad \checkmark$$