COEFFICIENTI BINOMIALI

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

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

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

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

3) $\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-1}{k}$ $\quad 1 \le k \le n-1$

$\frac{n!}{k!(n-k)!} = \frac{(n-1)!}{(k-1)!(n-1-k+1)!} + \frac{(n-1)!}{k!(n-k-1)!} =$

$= \frac{(n-1)!}{(n-k)!(k-1)!} + \frac{(n-1)!}{k!(n-k-1)!} = \frac{k\,(n-1)! + (n-k)(n-1)!}{k!(n-k)!} =$

$(n-k)(n-k-1)!$ $\qquad k(k-1)!$

$= \frac{(n-1)!\,(k+n-k)}{k!(n-k)!} = \frac{n!}{k!(n-k)!}$

$n! = n\cdot(n-1)! = n(n-1)(n-2)! = \dots = n(n-1)\cdot\dots\cdot 1$

4) $\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-2}{k-1} + \dots + \binom{k}{k-1} + \binom{k-1}{k-1}$ con $1 \le k \le n$