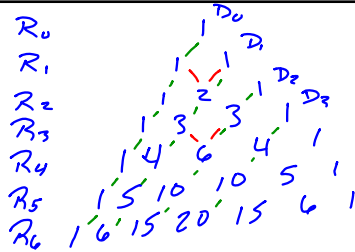


6.6 Pascal's Triangle

A collection of numbers laid out in rows and diagonals that have many unique traits

Blaise Pascal



$4C4 = 1$ how many ways can you choose all of them

$4C0 = 1$ how many ways can you choose none of them

$4C1 = 4$ ABCD, ABC, ABD, ACD, BCD

$4C3 = 4$ AB, AC, AD, BC, BD, CD

$4C2 = 6$

Direct Correlation to Combinations

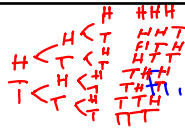
nC_0 nC_1 nC_2 nC_3 nC_4 nC_5
 Pascal's Δ
 nCr
 n = row number
 r = diagonal
 $5C3$

$$5C3 = \frac{5!}{(5-3)!3!} = \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{(2 \cdot 1)(3 \cdot 2 \cdot 1)} = 10$$

another useful thing

1	$r_0 = 1 = 2^0$
1 1	$r_1 = 2 = 2 = 2^1$
1 2 1	$r_2 = 4 = 2 \cdot 2 = 2^2$
1 3 3 1	$r_3 = 8 = 2 \cdot 2 \cdot 2 = 2^3$
1 4 6 4 1	$r_4 = 16 = 2 \cdot 2 \cdot 2 \cdot 2 = 2^4$
1 5 10 10 5 1	$r_5 = 32 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5$
1 6 15 20 15 6 1	$r_6 = 64 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6$

sum of $r_n = 2^n$



flip a coin 5 times

number of results $r_5 = 2^5 = 32$

0 1 2 3 4 5 \Rightarrow Diagonals
 1 5 10 10 5 1 Number of Heads

How many results have exactly 0 heads? 1

more than 3 6

less than 3 16