Permutation and Combination Examples

Example:

• The number of ways of obtaining an <u>ordered</u> subset of r elements from a set of n elements is given by

n P r = n!/(n-r)!

e.g., 5 people with 3 chairs: number of permutations (scenarios) they can sit:

5x4x3 = 60

(order is important)

0! Definition

• Mathematicians defined it as 0!=1

• Why? nPn = n! / (n-n)! = n!

Combination

- Order is <u>not</u> important!
- nCr= n! / (r!(n-r)!)
- Example: : 4 coin tosses, fair coin
- 2Heads = HHTT, HTHT, HTTH, THTH, THHT, TTHH

• $4C_2 = 4!/(2!2!) = 4x3/2 = 6$

Binomial Distribution

- Example: 5 coin tosses, fair coin: P(H)=1/2=P(T)
- P(No heads) = 1/32 = 5**C**0/32
- P(1 head) = $5C_{1/32} = (5!/4!)/32 = 5/32$
- P(2 heads) = $5C_{2/32} = (5!/(2!3!)/32 = 10/32)$
- P(3 heads) = 5C3/32= 10/32
- P(4 heads) = 5C4/32 = 5/32
- P(5 heads) = 5**C**5/32 =1/32
- We use combination because order is not important