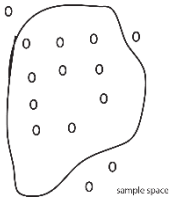
Probability & Statistics

Assign a priori equal outcomes to all events in sample space



If W points in sample space $p_i = \frac{1}{W}$

$$\sum p_i = 1$$

$0 \leq p_i \leq 1$

Mutually exclusive events $p_{i+j} = p_i + p_j$

E.g Prob. any aces and 6 of spades =4/52 + 1/52 = 5/52

Independent events $p_{i+j} = p_i . p_j$

E.g. Prob any ace + heads of one coin = (4/52).(1/2) =1/26

Permutations

n objects in line No ways =n!

n objects but p identical No independent ways =n!/p!

Permutations of r objects chosen from n: No. of permutations ${}^nP_r$ = n!/(n-r)!

Do not care about order i.e abc, acb bca are same:

No of combinations: ${}^nC_r$ = n!/(n-r)!r!

Statistics: Mean $\bar{x} = \sum_i p_i x_i \quad p_i = \frac{n_i}{N} \quad \sum_i p_i = 1$

p can be a continuous function $\int p(x) = 1$

Example: Gaussian $p(x) = \frac{exp[(x-\bar{x})/2(\Delta x)^2]}{\sqrt{2\pi\ |\Delta x|}}$ Mean $\bar{x}$

Standard deviation ("width") Δx

Problem 13

Let p_A, p_B, p_C be probability that A, B and C be first to toss coin. If they proceed in order A, B and C. First to toss heads up wins.

$p_A=2p_B=4p_C$. Sum rule $p_A+p_B+p_C=1$

$(4+2+1)p_C=1$ $p_C=1/7$, $p_B=2/7$, $p_B=4/7$