$P(A) = 0$ No prob at all
$P(A) = 1$ (Sure Event)

Sum of probabilities of all possible events = 1

$0 \leq P(A) \leq 1$

$P(A) = \frac{n(A)}{n(S)}$ For: Mutually Likely Events equal chances of occur

Event S.S

Trial: single Performance of event

Simple Event: Single Outcome VS Compound Event: More than 1 outcome

Mutually Exclusive Events: $A \cap B = \phi$ No A & B can occurs at same time

Not Mutually Exclusive: $A \cap B \neq \phi$

Independent Events: Occuring of 1 event no effect 2nd event

Dependent Event: Opposite

Collectively Exhaustive Events: Union of 2 events from S.S They are mutually exclusive.

prob of king ↓ just selecting

prob of get 2 king not use more than 1 kings

Not ordering

Combination: ~~Multip~~ Permutation: order Hierarchy selection without replacement

Complement of Event: $A = \{1, 2, 3\}$

$\bar{A} = S.S - A$

$P(\bar{A}) = 1 - P(A)$

Counting of sample Points: 'Multiplicative' Rule: no. of elements in events: $(n_1 \times n_2)$

2 Events are independent (Condition)

n-permutations: $\frac{n!}{n_1! n_2! \cdots n_k!} = \begin{cases} n \\ n_1! \cdots n_R! \end{cases}$

(1) Two coins are tossed

(i) P(At least one Head)

S.S = {HH, HT, TH, TT}

$P(A) = 3/4$

(2) P(At most two Head)

$P(A) = 3/4$

2^n → no. of trials

Forming sample space

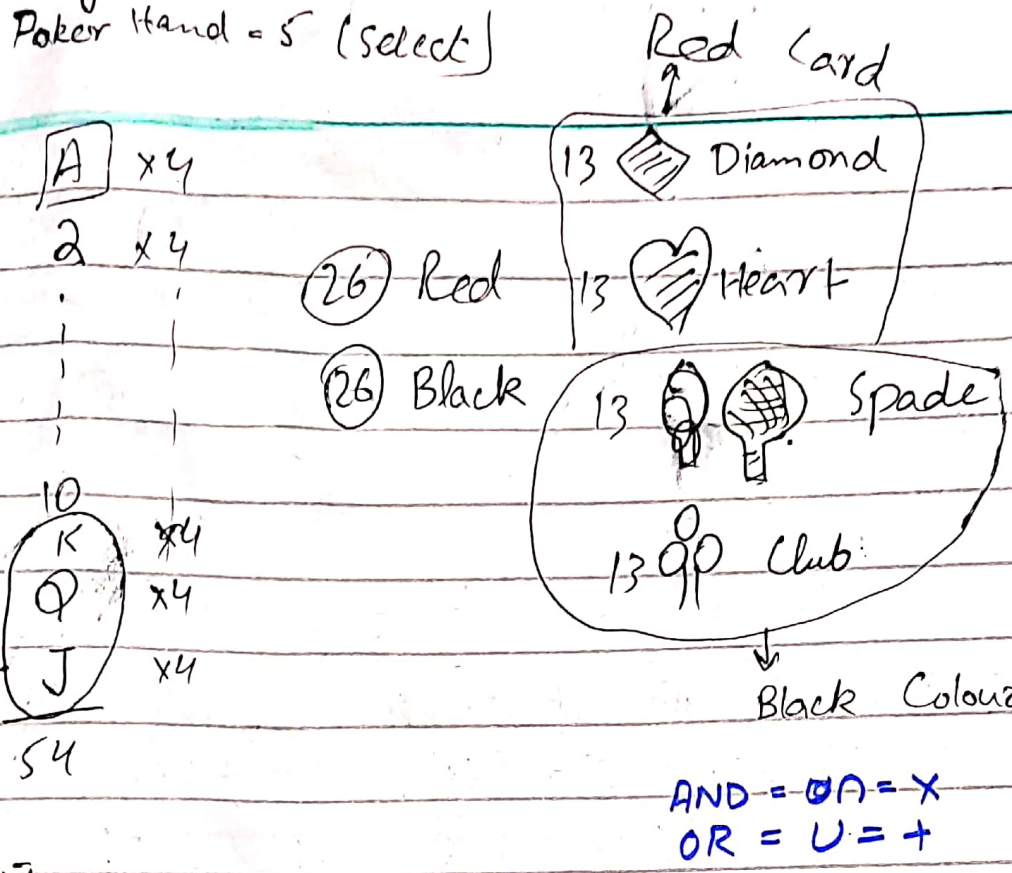
Let $n = 3$

$2^3 = 8$

$8/2 = 4$, $4/2 = 2$, $2/2 = 1$

HHH	THH
HHT	THT
HTH	TTH
HTT	TTT

Bridge Hand = 13 (Select)
Poker Hand = 5 (select)



AND = ∩ = ×
OR = ∪ = +

holding 2 aces & 3 Tacks

$$P(E) = \frac{{}^4C_2 \times {}^4C_3}{{}^{52}C_4}$$

Addition laws of Prob:

- Law of Mutually Exclusive Events

$$P(A \cup B) = P(A) + P(B)$$

- Law of NOT Mutually Exclusive Events

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$$

If events A and B are independent:

$$P(A \cap B) = P(A) \cdot P(B)$$

1,1	2,1	6,1
1,2	2,2	6,2
1,3	2,3	6,3
1,4	2,4	6,4
1,5	2,5	6,5
1,6	2,6	6,6

Q3: $P(S) = 0.7$

$P(B) = 0.4$

$P(S \cup B) = 0.8$

(i) $P(S \cap B) = ?$

(iii) $P(S' \cap B') = ?$

$P(S \cup B) = P(S) + P(B) - P(S \cap B)$

$P(S' \cap B') = P(S \cup B)'$

$= 1 - P(S \cup B)$

$= 1 - 0.8 = 0.2$

(i) 3 aces, 2 other cards (Total 4 aces. Now remaining $52 - 4 = 48$)

$$P(A) = \frac{{}^{4}C_3 \; {}^{48}C_2}{{}^{52}C_5} = 0.0001$$

(iv) 4 hearts & 1 club

$$\frac{{}^{13}C_4 \; {}^{13}C_1 \; {}^{26}C_0}{{}^{52}C_5}$$

$n = 500$

Smoke $= 210$

Eat $= 216$

D $= 258$

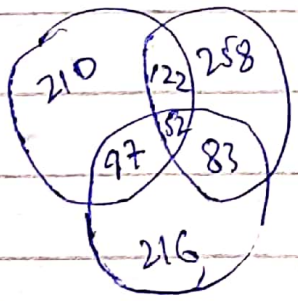
$S \cap D = 122$

$E \cap D = 83$

$D \cap S \cap E = 52$

$S \cap E = 97$

(iv) $P(E \cap D \cap S')$



$$\frac{83}{500} - \frac{52}{500}$$

$= 0.06$

138
28
50 22
28 22
100

Conditional Probability

$$P(A/B) = \frac{P(A \cap B)}{P(B)}$$

If B occured, probability of A. already

$P(B) \neq 0$

Ex 34: $P(D) = 0.83$

$P(A) = 0.82$

$P(A \cap D) = 0.78$

$$P(A/D) = \frac{P(A \cap D)}{P(D)} = \frac{0.78}{0.83} = 0.94$$

'A' grade

j=10 $A/T = 3$

S=30 $A/S = 10$

G=10 $A/G = 5$

$P(A/S) = 10/18$

2.75: $P(M/S) = \frac{P(M \cap S)}{P(S)} = \frac{28/200}{78/200}$