Probability

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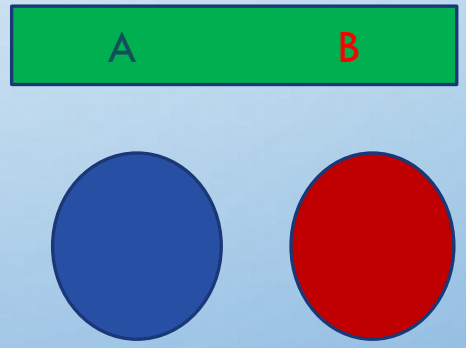
Probability

- The likelihood of occurrence of any event is called as probability.
- Range : (0-1)
- Eg: In tossing a coin :
    - The outcomes are head/ tail
    - As both have equal chances, p(head)=p(tail) =0.5
    - sample set ={ H, T}
    - Sum of all elements occurrence =1.
    - Formula is P=(no. of desired outcomes/ total no. of outcomes)

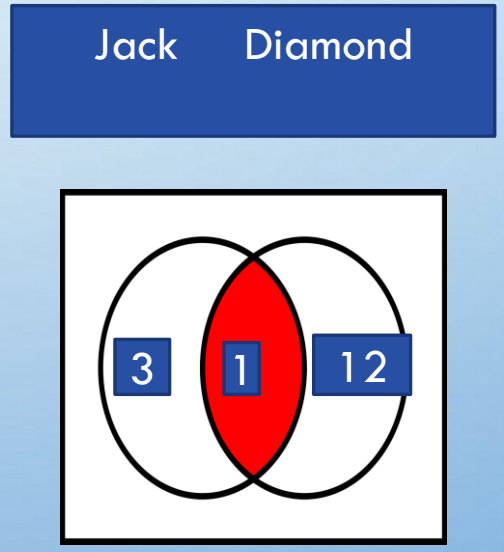
Mutually Exclusive Events

- Any 2 Events that cannot occur at a time.
- Tossing a coin and getting a head & tail can’t occur simultaneously.
- P(A U B) = P(A) + P(B)



Mutually Inclusive Event

- Events which aren’t mutually exclusive comes under this.
- Eg: Events of getting a jack and a diamond comes under this.
- P(AUB) = P(A) + P(B) – P(A AND B)



Independent Events

- If the outcomes of 1st event doesn't affect on the outcomes of the 2nd event.
- P(A AND B) = P(A).P(B)
- Eg: While rolling 2 diff. dies, the events of getting odd number on 1st die and even number on 2nd die are independent events.

Dependent Events

- If the outcomes of 1st event shows an affect on the outcomes of 2nd event, is called as dependent events.
- P(A AND B) = P(A).P(B/A)
- Eg : A jar contains 3 white balls, 2 black balls, 3 blue balls. What is the probability of getting 2 white balls in 2 draws and without replacement.

P(2 white balls)= [(3/8) * (2/7)]

= (6/56) = 3/28 (0.107)

Conditional Probability

- It is the probability of occurrence of 2 dependent events one after the other.
- For dependent events :
- $P(A \text{ AND } B) = P(A).P(B/A)$
- Here $P(B/A)$ is the conditional probability

- From above equation :
- $P(B/A) = [P(A \text{ AND } B)/P(A)]$

Bayes Theorem

- To calc. Conditional Prob. When the value of P(A AND B) is not available.
- $P(A \text{ AND } B) = P(A).P(B/A)$ - (1)
- $P(A \text{ AND } B) = P(B).P(A/B)$ - (2)

- From (1) & (2), by equating them :

$$P(A).P(B/A) = P(B).P(A/B) – (3)$$

- Hence Conditional probability of A, given event B has occurred is $P(A/B)$.
- $P(A/B) = (P(B/A).P(A)) / P(B)$

- Similarly $P(B/A) = (P(A/B).P(B)) / P(A)$

ASSIGNMENT -2

- P(odd OR prime) on a spinner from 1-8 ?
- Sample space ={1,2,3,4,5,6,7,8}
- Odd (A) ={1,3,5,7} , Prime (B) ={2,3,5,7}
- It is a mutually exclusive event.
- P(A U B) = P(A) + P(B) – P(A AND B)
- P(odd OR prime) =P(odd) + P(prime) – P(odd AND prime)
- = (1/2)+(1/2) – (3/8)
- = (5/8)

- For numbers in 1-9 , hat is the probability of getting a number less than 4 or 2 ?
- P(<4 OR < 2) = P(<4) + P(<2) – P(<4 AND <2)
- = (3/9) + (1/9) – (1/9)
- = 3/9

- GIVEN : X , Y ARE 2 INDEPENDENT EVENTS. P(X) =0.3 P(Y) = 0.7
- P(X AND Y) = 0.3 * 0.7 = 0.21
- P(X OR Y) = 0.3 + 0.7= 1