

$$\begin{array}{l} \text{Q: Coin} \\ \text{P(H) ?} \end{array}$$

Probability = [0, 1]

$$P(H) = \frac{1}{2}$$

Q: dice

$$P(1) = \frac{1}{6}$$

$$P(2) = \frac{1}{6}$$

Q: Deck

$$P(9) = \frac{13}{52}$$

① Mutually Exclusive Event (Additive Rule)

$$P(H \text{ or } T) = P(H) + P(T)$$

$$= \frac{1}{2} + \frac{1}{2} \Rightarrow 1$$

Q: P(H) or P(T) when tossing a coin

\Rightarrow Both event can't occur together.

$$P(2 \text{ or } 4) = P(2) + P(4) \Rightarrow \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$$

② Non Mutually Exclusive Event (Additive Rule)

⇒ Both event can occur together

$P(\heartsuit)$ or $P(K)$?

$$P(\heartsuit \text{ or } K) = P(\heartsuit) + P(K) - P(\heartsuit \cap K)$$

$$= \frac{13}{52} + \frac{4}{52} - \frac{1}{52}$$

$$= \frac{16}{52}$$

Both can occur together

ME:

$$P(A \text{ or } B) = P(A) + P(B)$$

NME:

$$P(A \text{ or } B) = P(A) + P(B) - P(A \cap B)$$

Additive Rule

Independent Event (Multiplicative Rule)

Q: Tossing a coin twice, $P(H)$ and $P(T)$

-> one event can't affect other event

$$P(H \text{ and } T) = P(H) * P(T)$$

$$= \frac{1}{2} * \frac{1}{2} \Rightarrow \frac{1}{4}$$

⊕ Probability of second event is going to be same.

Q: Rolling a dice twice

$$P(6 \text{ and } 1) = \frac{1}{6} * \frac{1}{6} \Rightarrow \frac{1}{36}$$

Dependent Event (Multiplicative Rule)

⇒ Probability of next event
gets reduced.

→ One event can affect other event.

Q: Drawing a card twice without replacement?

$P(Q)$ and $P(K)$

$$\begin{aligned} P(Q \text{ and } K) &= P(Q) * P(K|Q) \\ &= \frac{13}{52} * \frac{4}{51} \Rightarrow \checkmark \end{aligned}$$

Conditional Probability

(*) Probability of K when $P(Q)$
has already occurred.

② Multiplicative Rule

① Independent Event

$$P(A \text{ and } B) = P(A) * P(B)$$

② Dependent Event

$$P(A \text{ and } B) = P(A) * P(B|A)$$

$$PA = ?$$

$$SS = 2$$

$$FE = 1$$

$$RA = FE/SS$$

$$= 0.5$$

SG, SR, RH

GGWH

P(G and G) When you draw twice w/o replacement?

$$\cdot \frac{5}{14} * \frac{4}{13}$$

Permutation & Combination

-
↓
repetition
(Groups)
↓
Unique
(Groups)

Blue, Green, Red, Pink

✓ BG
✓ GB
RG
GR

(Permutation)

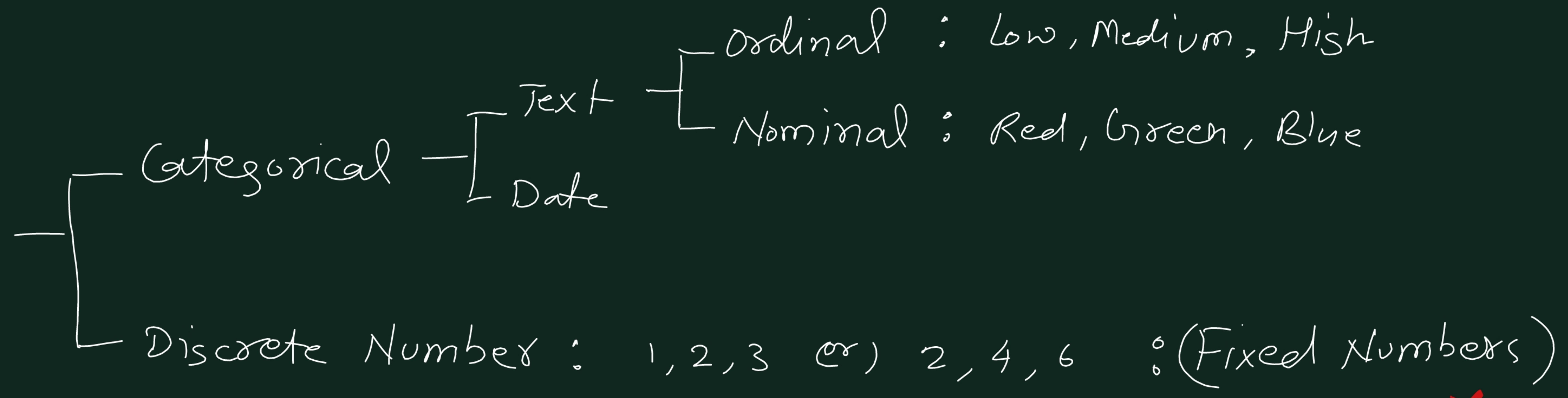
(Combination)

$$\text{Permutation} = \frac{n!}{(n-r)!}$$

$$\text{Combination} = \frac{n!}{r!(n-r)!}$$

Data

① Discrete



② Continuous

→ Continuous Numbers :



(Every
Number
is valid)