x = 78

40

40/100

Data → Analysis

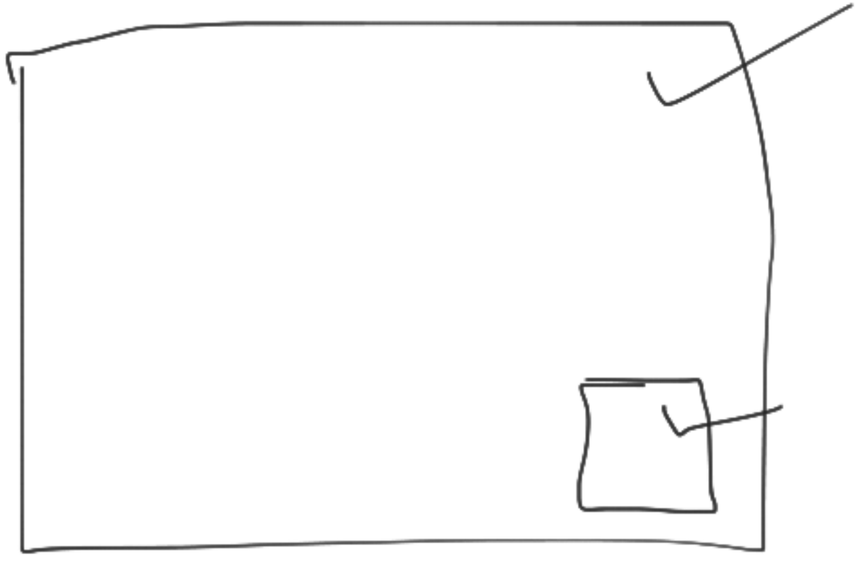
1 - 23
2 - 19
3 - 33
4 - 29
5 - ?

Pattern

5

Name. Trasaction
A $10M
A $20M

Random Variable



Central Tendency - Mean, Median, Mode

Covariance
Karl Pearson Correlation Coefficient -> -1 to 1
Spearman Rank Correlation

1
0.95
0.3

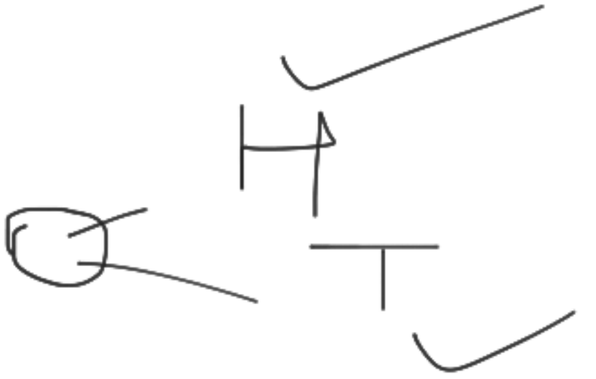
Probability

chances

likelihood

It is a measure of the likelihood of an event.

It is a measure of the chance that a particular event will occur.



$$\text{Probability} = \frac{\text{No. of ways an event can occur}}{\text{No. of possible outcomes}} = \frac{1}{2} = 0.5$$

There is a 50% chance of getting a head

You will get a head

Probabilty will range from 0 to 1

Sample Space -> It is a collection of all the possible outcomes

Flipping a coin -> SS {H,T} -> 2
Flipping two coin -> SS {HH, HT, TH, TT} -> 4

Dice Rolling Probability

SS -> {1,2,3,4,5,6} -> 6

3 or 6

$$3 \quad \frac{1}{6} \quad \frac{2}{6} = \frac{1}{3}$$

Card Probability

Total no. of cards = 52

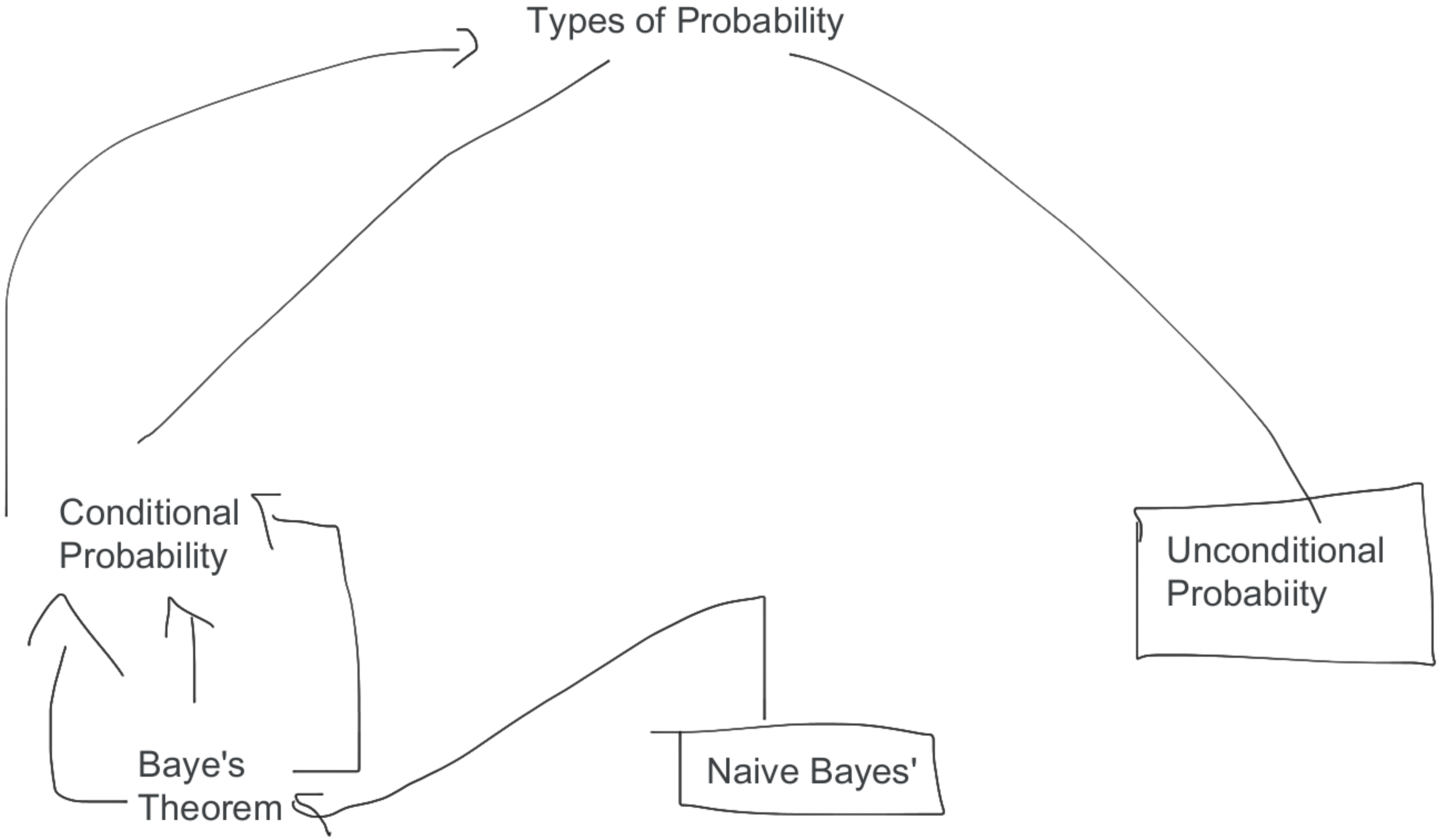
(R) Hearts: A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K
(R) Diamonds: A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K
(B) Clubs: A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K
(B) Spades: A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K

Drawing a King from a deck of card

P(event) = 4/52 = 1/13

Rule of Complimentary Events

P(occur event) + P(Not occur event) = 1


Types of Probability
Conditional Probability
Unconditional Probabiity
Baye's Theorem
Naive Bayes'

Rules of Probability

1. Addition Rule (OR)
2. Multiplicative Rule (AND)

Addition Rule (OR)

Mutually Exclusive Event - If the two events cannot occur at the same time
Non-mutually Exclusive Event - If the two events can occur at the same time

Mutually Exclusive

Q. On flipping a coin, what is the probability of getting either a head or tail?

P(H) = 1/2 = 0.5
P(T) = 1/2 = 0.5

P(H or T) = P(H) + P(T) = 0.5 + 0.5 = 1

Non- Mutually Exclusive

Q. While picking randomly from a deck of cards, what is the probability of drawing a card that is a heart or a king?

P(H) = 13/52
P(K) = 4/52
P(H&K) = 1/52

P(H or K) = P(H) + P(K) - P(H&K)
= 13/52 + 4/52 - 1/52 = 16/52 = 0.31

Multiplicative Rule (AND)

Independent event: If the two events are independent of each other i.e., they do not affect each other occurance

Dependent event: If the two events are dependent of each other i.e., they do affect each other occurance

Independent Event

Q. What is the probability of getting a 5 and then a 3 with a normal die.

P(5) = 1/6
P(3) = 1/6

P(5 AND 3) = P(5) * P(3) = 1/6 * 1*6 = 1/36

Dependent Event

Q. What is the probability of drawing a King and then a Queen from a deck of cards?

P(K AND Q) = 4/52 * 4/51

P(A and B) = P(A) * P(B|A)
P(K and Q) = P(K) * P(Q|K) = 4/52 * 4/51
= 0.006 = 0.6%

* Conditional Probability

HH, HT, TH, TT - 4

Permutation & Combination

HH, TT, HT|TH - 3

Permutation - It is an act of arranging items in some sequence or order (ORDER MATTERS)

Combination - It is an act of selecting items from a collection in such a way that the order of the selection does not matter (ORDER DOES NOT MATTER)

Permutation -> ORDER MATTERS

Q. Imagine you are visiting a Zoo where there are 6 animals. I ask you to record the first 3 animals that you see.

Lion, Tiger, Elephant, Leaopard, Cheetah, Monkey

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

n = 6
r = 3

n - Total no. of objects
r - No. of objects you are picking

L, T, E
L, E, T

nPr = 6!/(6-3)! = 6!/3! = 6*5*4 = 120

Combination -> ORDER DOES NOT MATTERS

Q. Imagine you are visiting a Zoo where there are 6 animals. I ask you to record the first 3 animals that you see.

Lion, Tiger, Elephant, Leaopard, Cheetah, Monkey

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

nCr = 6!/(3! * (6-3)!) = 6!/(3! * 3!) = (6*5*4)/(3*2*1) = 5*4 = 20

1. Conditional Probability
2. Independent Event
3. Dependent Event

Bayes' Theorem

It is use to describe the probability of occurence of an event related to any condition. It is just an extension of conditional Probability.

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

Likelihood, Prior, Posterior Prob., Marginal

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

$P(A \cap B) = P(A) * P(B|A)$
$P(B \cap A) = P(B) * P(A|B)$

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

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

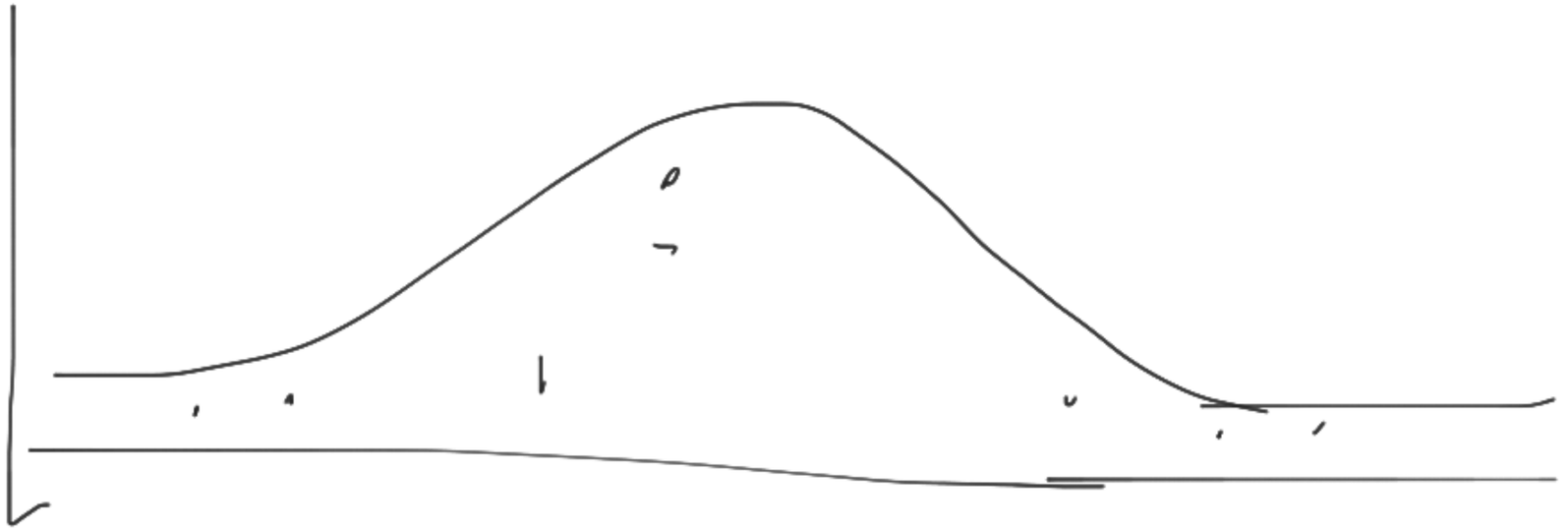
$A = \{1,2,3,4,5\}$
$B = \{4,5,6,7,8\}$

$A \cap B = \{4,5\}$
$B \cap A = \{4,5\}$

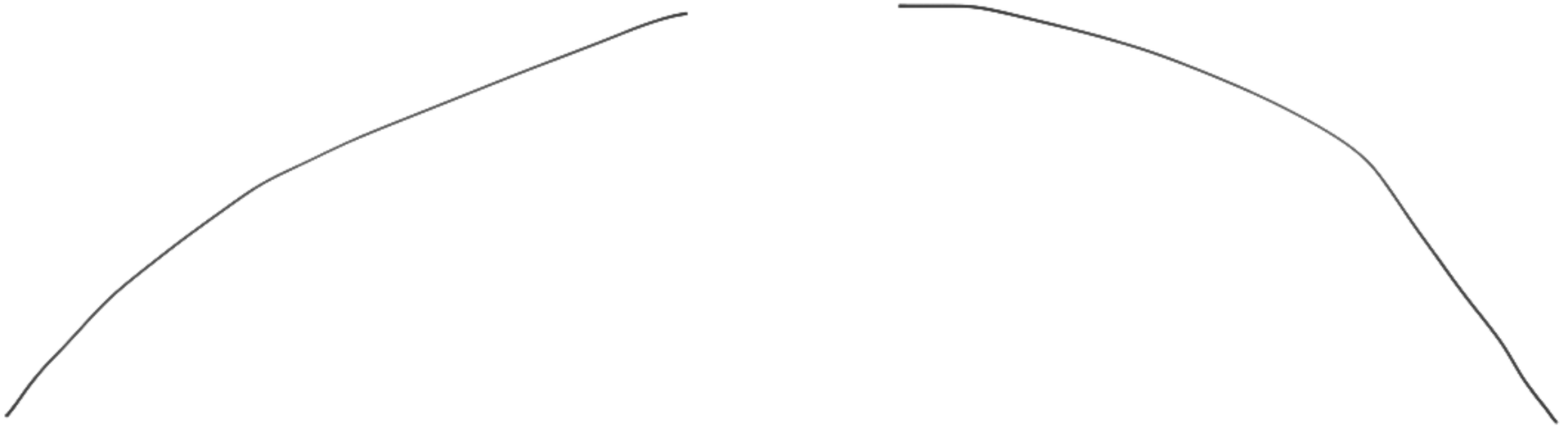
$P(A|B) * P(A) = P(B|A) * P(B)$

Probability Distribution → To ease the sample space

It can be defined as a distribution of frequencies which is not based on the actual outcome or observations but is constructed through the expected frequencies obtained by the mathematical computations or operations based on certain hypothesis. → Assumptions



Types of Probabilty Distribution

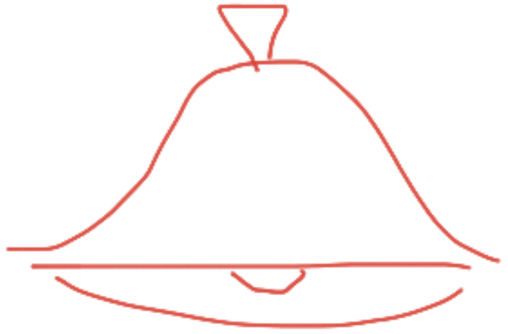


Discrete Distribution

1. Bionomial
2. Poisson
3. Rectangular
4. Multinomial
5. Negative Binomial
6. Geometric

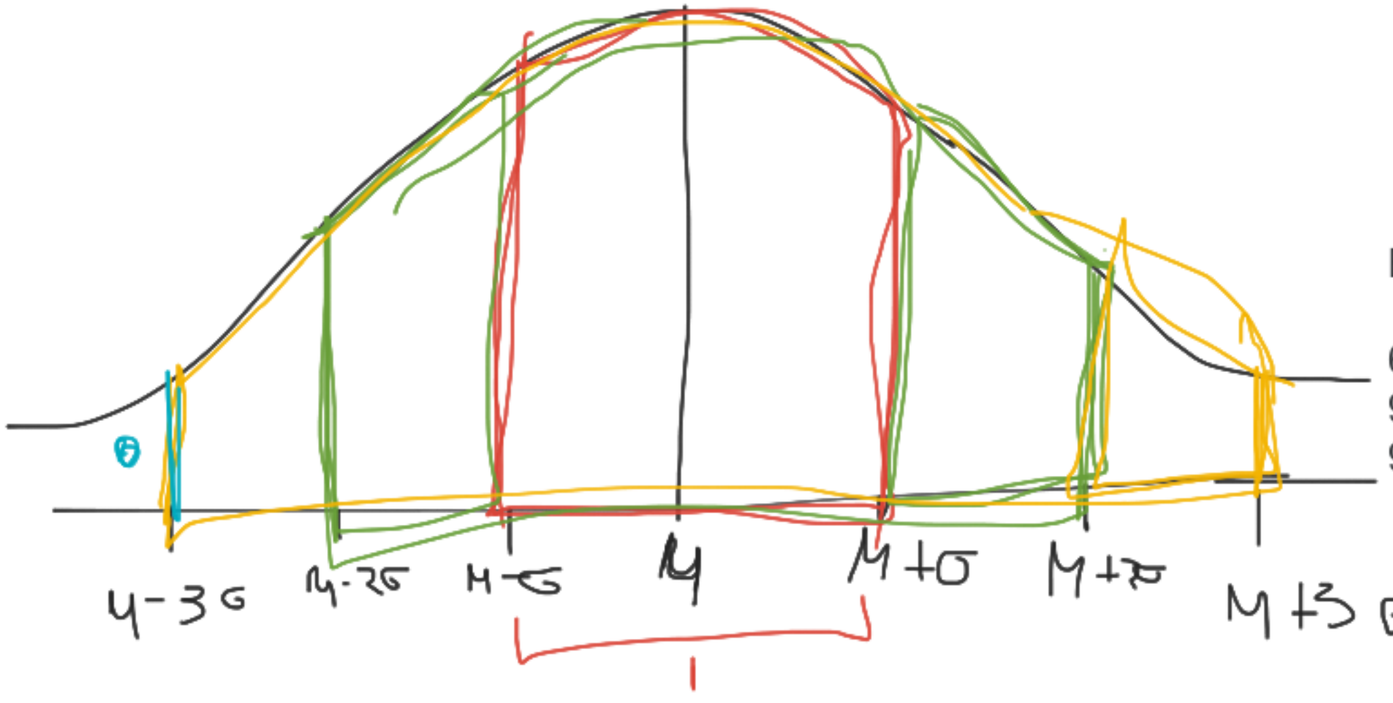
Continuous Distribution

1. Normal
2. Student t-test
3. Chi Square
4. f-test



Normal/Gaussian Distribution

$$X \simeq GD(\mu, \sigma)$$



Properties:

1. Mean, median & mode will be same
2. The curve is a bell curve
3. The total area under this cure is 1

Emperical Formula

68% data falls within the 1st SD of the mean
95% data falls within the 2nd SD of the mean
99.7% data falls within 3rd SD of the mean

The normal distribution has a SD of 10. Approx. what area is contained b/w 70 & 90