

Probability :- The likely hood or chances of happening.

Range :- 0% to 100%
0 to 1

Variable :- Just like a container that save the data. -

① Algebraic Variable :-

$$y = mx + c$$

$$x + 5 = 10$$

$$x = 10 - 5$$

$$x = 5$$

Constant

② Random Variable :- The Value of the variable changes randomly.

Q = Throwing a dice.



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

Coin ^{variable} $\rightarrow x = \{H, T\}$

Discrete RV
for

$\{1, 2, 3, 4, 5, 6\}$

$\{H, T\}$

Continuous RV

ex- Height of the classroom.

Probability = $\frac{\text{Possible outcome}}{\text{Total outcome}}$

ex- Throwing a dice.

$$\text{Total outcome} = \{1, 2, 3, 4, 5, 6\} \\ = 6$$

Probability of 4

$$\text{probability} = \frac{1}{6}$$

$$\text{probability of head (H)} = \frac{1}{2} = \underline{\underline{0.5}}$$

$$\text{Total prob} = 1$$

$P(T)$

$$= 1 - 0.5 = \underline{\underline{0.5}}$$

Probability Distribution

Cross Tab

Tossing a
Coin

Coin Toss	H	T
probability	$\frac{1}{2}$	$\frac{1}{2}$

Throwing a die.

die	1	2	3	4	5	6
probability	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Throwing two
dice at a time.

die 1 \ die 2	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

$$P(2) = \frac{1}{36} \quad P(3) = \frac{2}{36} \quad P(4) = \frac{3}{36} \quad P(5) = \frac{4}{36}$$

$$P(6) = \frac{5}{36} \quad P(7) = \frac{6}{36} \quad P(8) = \frac{5}{36} \quad P(9) = \frac{4}{36} \quad P(10) = \frac{3}{36}$$

$$P(11) = \frac{2}{36} \quad P(12) = \frac{1}{36}$$

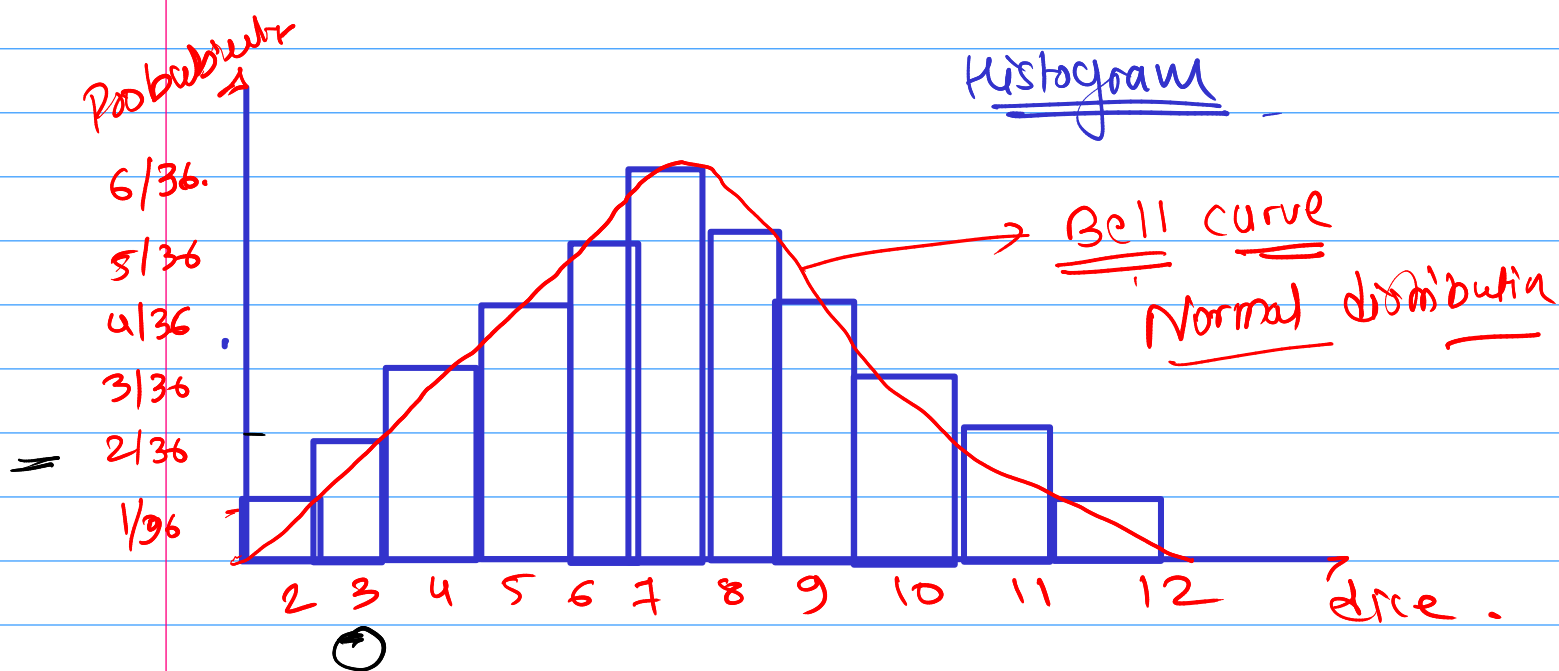
Throw 3 time

PDF

= Probability distribution function.

① It help us to identify the distribution of the data in graphical form.

② If any function matches the standard distributions then we can calculate everything about the data using standard formulas.



KDE = Kernel density estimators.
↳ smoothen the histogram.

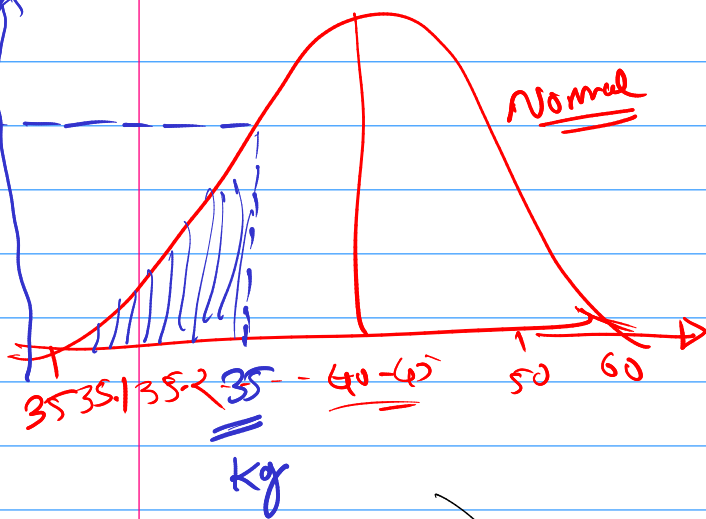
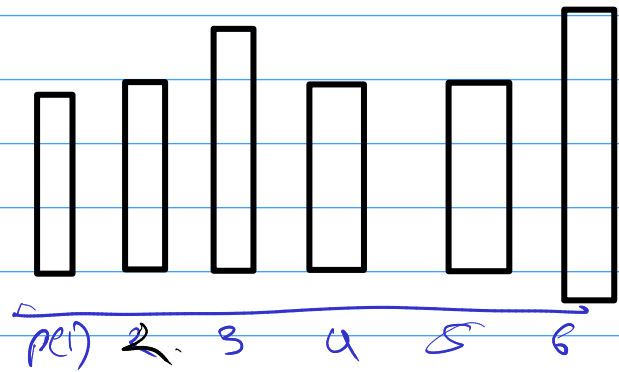
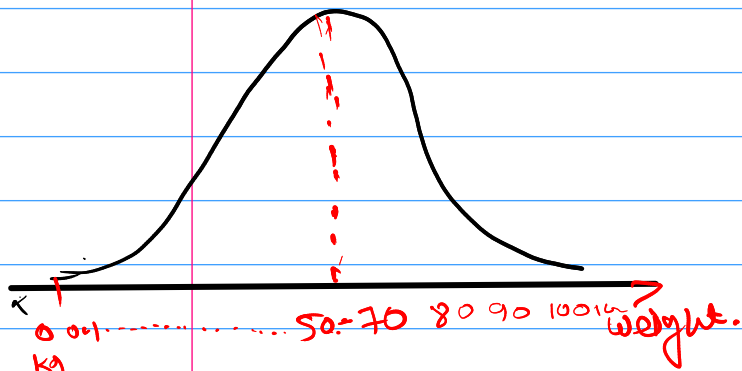
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Probability Density
function

(Continuous)

Probability Mass
Function.

(Discrete)



Probability mass function
for 4 in die.

$$P(1) + P(2) + P(3) + P(4)$$

$$\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{4}{6}$$

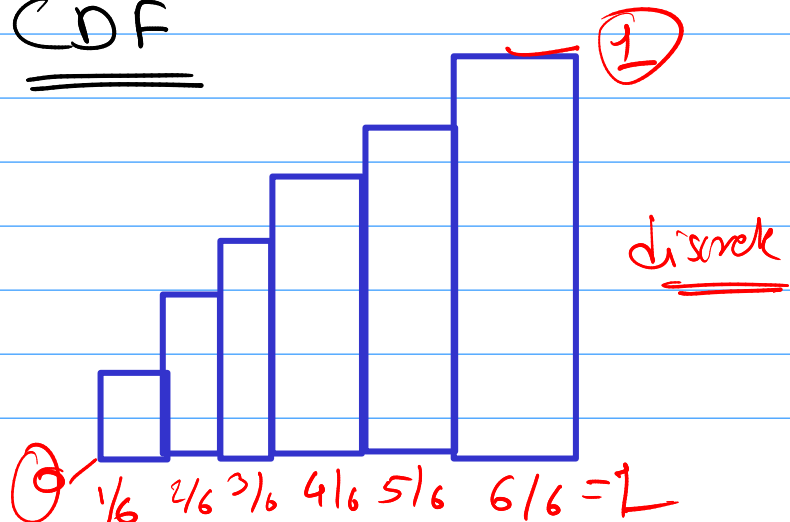
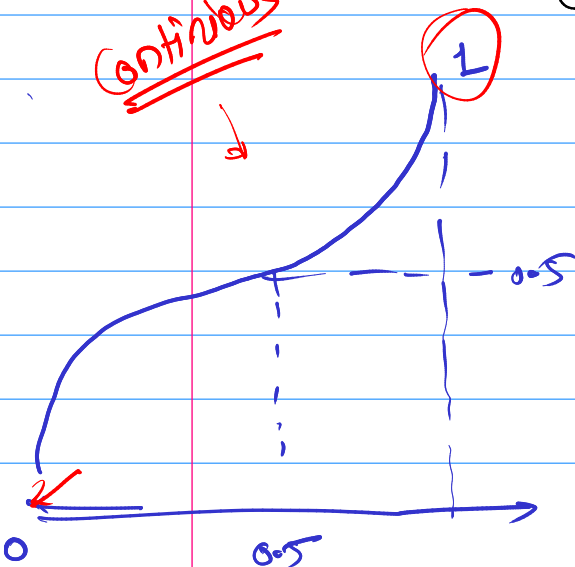
(Continuous)

Cumulative

CDF

Density

Function



① Normal & Gaussian Distribution

② Bernoulli Distribution

③ Uniform Distribution

④ Poisson Distribution

⑤ Binomial Distribution

⑥ Log - Normal Distribution.