

PROBABILITY

Definition:

A **probability** distribution is a table or an equation that links each outcome of a **statistical** experiment with its **probability** of occurrence.

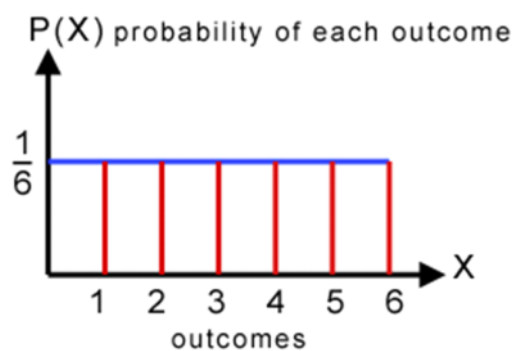
- **Experiment:** Throwing a die
- Define **X: Random Variable**
- **X** = {1,2,3,4,5,6} is called **Sample space**
- **Event:** The thing of my interest if it happens, then i can say Event is occurred.
- The event is a subset of Sample space
- **Probability** of any event =
$$\frac{\text{\# of Events}}{\text{\# of Sample space}}$$

If I know all the possible values of 'X' and its respective probabilities then i can say that I know the Random variable completely

X	P (X = r)
1	1/6
2	1/6
3	1/6
4	1/6
5	1/6
6	1/6

All are having Equal opportunities i.e 1/6

If I know the Random variable 'X' and its probabilities of 'X' then the shape of the curve on histogram is called probability distribution.



Uniform Distribution

Sampling Distribution:

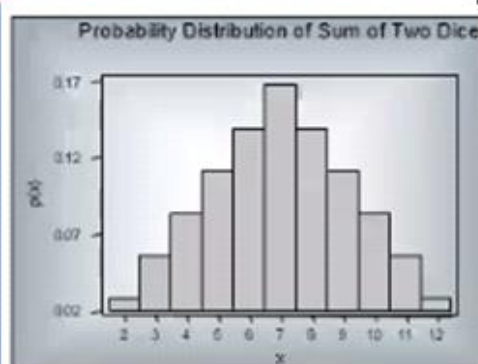
Ex: If two dice are thrown at a time then what are all the possibilities

Consider the experiment of **tossing two six-sided dice**. There are **36 possible outcomes**. Let the random variable **X** represent the **sum of the numbers on the two dice**:



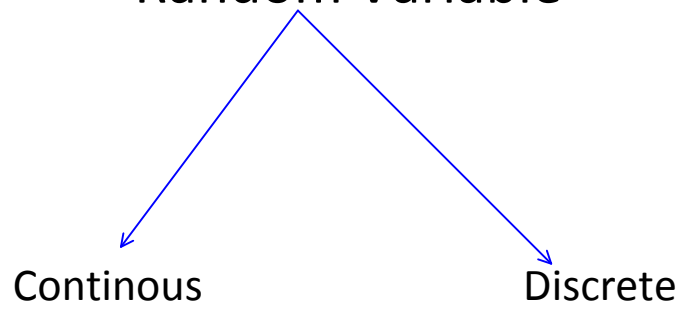
	2	3	4	5	6	7
1	1,1	1,2	1,3	1,4	1,5	1,6
2	2,1	2,2	2,3	2,4	2,5	2,6
3	3,1	3,2	3,3	3,4	3,5	3,6
4	4,1	4,2	4,3	4,4	4,5	4,6
5	5,1	5,2	5,3	5,4	5,5	5,6
6	6,1	6,2	6,3	6,4	6,5	6,6

x	P(x)*
2	1/36
3	2/36
4	3/36
5	4/36
6	5/36
7	6/36
8	5/36
9	4/36
10	3/36
11	2/36
12	1/36
	1



* Note that: $P(x) = (6 - \sqrt{(7-x)^2}) / 36$

Random Variable



Normal		Bernouli
Exponential		Binomial
Weibul		Poisson
Gamma		Geometirc
Logistic		Hyper Geometric
Log Normal		Negative Binomial