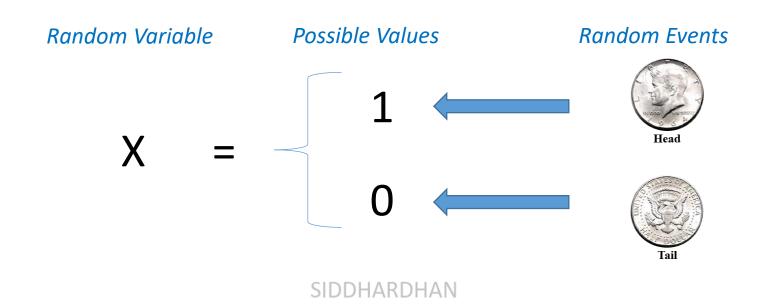# *Random Variables*

A Random Variable is a numerical description of the outcomes of Random events.

In other words, a random variable maps the outcomes of random events to numerical values.

Consider Tossing a Coin

Random Variable   *Possible Values*   *Random Events*

$$X \quad = \quad \begin{cases} 1 \\ \\ 0 \end{cases}$$

Head

Tail

Probability Distributions

The **probability distribution** for a random variable describes how the probabilities are distributed over the values of the random variable.

Tossing 3 Coins

			HHH	=	3	THH	=	2
			TTT	=	0	TTH	=	1
X	=	Sum of number of Heads when 3 coins are tossed	HHT	=	2	HTT	=	1
			HTH	=	2	THT	=	1

Probability Distributions

HHH = 3   THH = 2

TTT = 0   TTH = 1

HHT = 2   HTT = 1

HTH = 2   THT = 1

X (No. of Heads)	P(X = x)	P(X = x)
0	1/8	0.125
1	3/8	0.375
2	3/8	0.375
3	1/8	0.125

Discrete Probability Distributions