Bernouli Distribution :-

→ what is the difference between Defective & Defects?

Defective means either a product to purchase it or not
  └→ classification

Defects means No of defects present in the given product
  └→ countable

Ex:- Throwing a die we have a chance saying

$$P(x = 2) = 1/6 \longrightarrow P \rightarrow Success$$

$$P(\bar{x} = 2) = 5/6 \rightarrow (1-P) \longrightarrow Failure$$
$$(\bar{x} \text{ is called Compliment})$$

So, Here 'x' is Bernouli Random variable then out comes of

x is   1, 0

	x	P(x)
Success	1	·P·
Failure	0	$q = 1-P$

So, whenever any variables contains of data YES/NO Considered as
Bernouli variable Ex:- pass/fail in exam

we derived probability Mass function $[x \in \{0,1\}]$

$$\boxed{f(X = x) = P^x (1-P)^{1-x}}$$

Substitute the above Success, Failures values i-e, 0,1

$$f(x=1) = P^1 (1-P)^1 = P$$

$$f(x = 0) = P^0 (1-P)^{1-0} = 1-P$$

Let us find out $E(x), V(x)$

$$E(x) = \sum_{i=0}^{1} x \cdot p(n) \qquad \text{put our possible values of } x$$
$$\text{i-e, 0,1}$$

$$= 1 \cdot P + 0(1-P)$$

$$= P + 0 = P \Rightarrow E(x) = P$$

$$V(x) = E(x^2) - [E(x)]^2$$

We already known $E(x) = P$, let us find out $E(x^2)$

i.e, $E(x^2) = \sum_{i=0}^{1} x^2 \cdot p(x)$

$$= 1^2 \cdot p + O(p) = P$$

$\therefore \quad V(x) = P - (P)^2 = P - p^2 = P(1-P) = Pq$

$\Rightarrow \boxed{E(x) = P \ , \ V(x) = P(1-P)}$

i.e, $X \sim Ber(p)$, where 'p' stands for parameter