

Random Variables

(D_1, D_2) eg $(1, 3)$

		1	2	D_2	4	5	6
D_1	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

$D_1 + D_2 \rightarrow \text{sum} \rightarrow X$

$X \in [2, 12]$

random variable

- mapping of sample space to numeric values

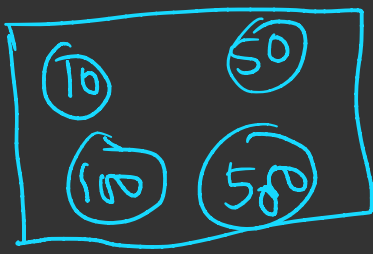
$$0 \rightarrow 0$$

$$1 \rightarrow 5-1.$$

$$2 \rightarrow 25-1.$$

$$3 \rightarrow 50-1.$$

$$4 \rightarrow 201.$$



$$\frac{1}{4} = 0.25$$

<u>Rs.</u>	<u>#</u>
10	50
50	30
100	10
500	10

Chances/prob.

$$50/100 = 0.5$$

$$0.3$$

$$0.1$$

$$0.1$$

$$\frac{10 + 50 + 100 + 500}{4}$$

$$= \underline{165} \text{ Rs.}$$

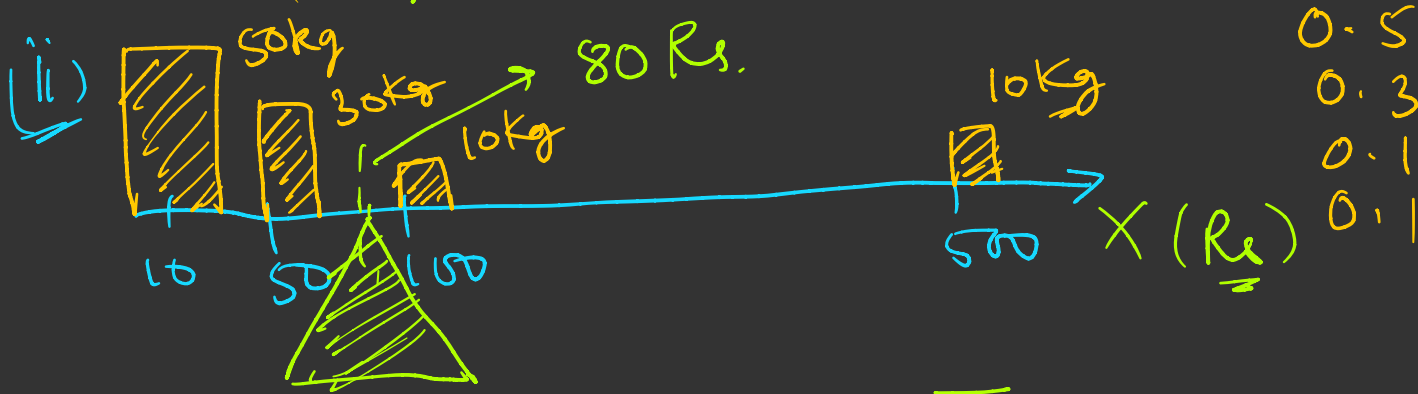
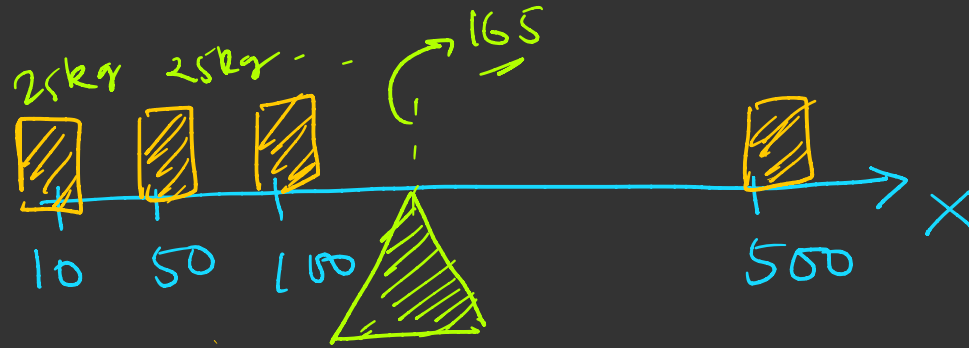
Avg value /
Expected value

Avg. / expected value

$$= 10 \times 0.5 + 50 \times 0.3 + 100 \times 0.1 + 500 \times 0.1$$

$$= \underline{\underline{80 \text{ Rs.}}}$$

i) Prob (0.25) 10, 50, 100, 500 \rightarrow X



Expected value = $E(X) = \sum X \cdot p(X)$

Weighted Avg. =

eg.) Tossing a coin 3 Times - $SS \rightarrow 8$ outcomes

$$P(H) = p$$

$$P(T) = 1 - p$$

\Rightarrow Random Variable is # of heads
 $X = 0, 1, 2, 3$


$$P(\text{Exactly 2 heads}) = ? = P(X=2)$$


$\Rightarrow (HNT, TNN, HTN) \rightarrow$ Exactly 2 head.

Prob of every sequence when _____
is same.

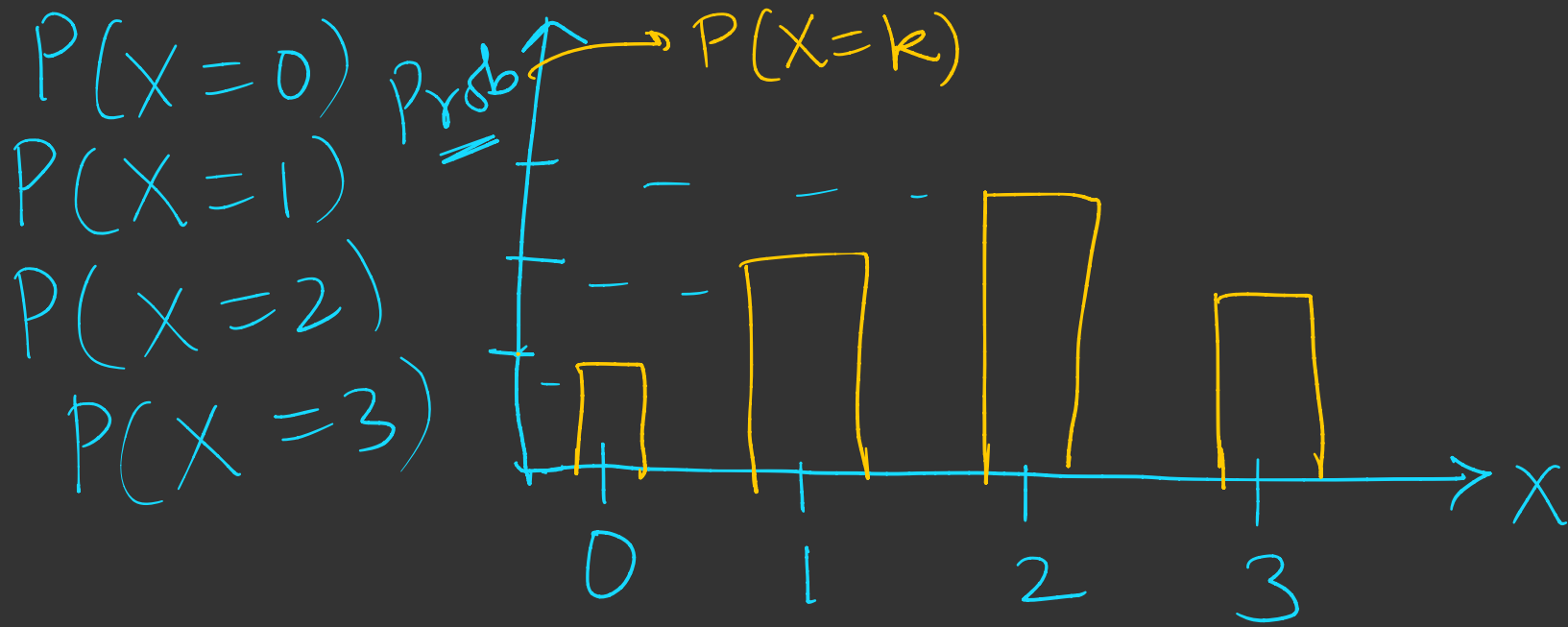
$$n=3$$

$$k=2$$

$$\boxed{{}^3C_2 \cdot p^2 (1-p)^1}$$


$$P(\text{Exactly } \underline{2} \text{ heads}) \\ = P(X=2)$$


$$P(\text{Exactly 'k' heads out of 'n' tosses}) \\ = {}^nC_k \cdot (p)^k \cdot (1-p)^{n-k}$$



- Binomial distribution
- discrete distribution

