PDF, CDF

19 May 2023 15:28

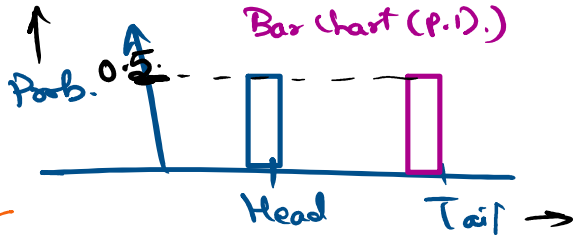
Random Variables → Discrete RV → Discrete P.D.

Random Variables → Continuous RV. → Continuous P.D.

Probability Distribution → How are the probabilities distributed across all the values of the R.V. (X).

1) X (DRV) → {Head, Tail} PMF

X	H, T
P(x)	½ ½



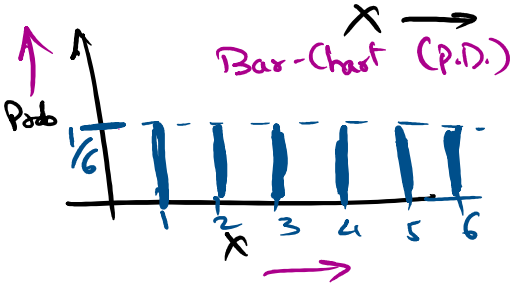
Unbiased

2) Roll of a Dice

DRV (x) → {1, 2, 3, 4, 5, 6}

PMF

x	1	2	3	4	5	6
P(x)	⅙	⅙	⅙	⅙	⅙	⅙

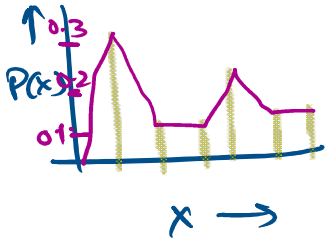


3) Roll of a Biased Dice (DRV) PMF

x	1	2	3	4	5	6
P(x)	0.3	0.1	0.1	0.2	0.15	0.15

DRV

P.D. for a Biased Dice.



PMF → Probability Mass Function.

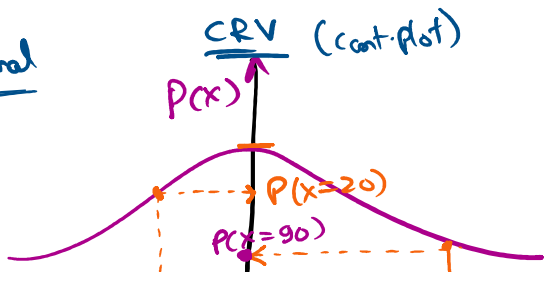
↳ P.D. Table for the DRV.

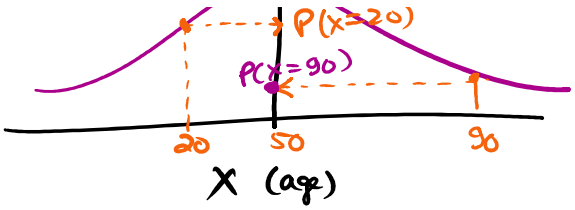
$\sum PMF = 1$

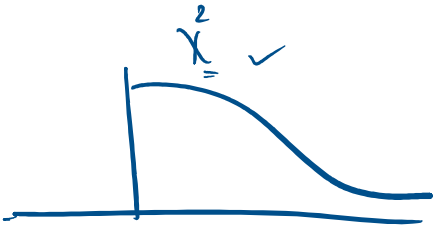
What PMF → DRV

PDF → CRV. Prob. density fⁿ

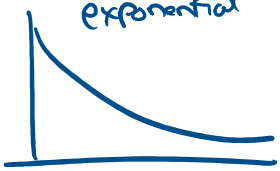
Normal







CRV PDF



Cumulative Density fn (CDF)

↓

Cumulative (Sum of) all the probabilities that a R.V. (x) can take a value less than or equal to a

CDF ⇒ $P(X \leq a)$

P(x) → PDF or PMF

D Roll of an unbiased Dice

[What is the prob. of getting a number ≤ 4 .?]

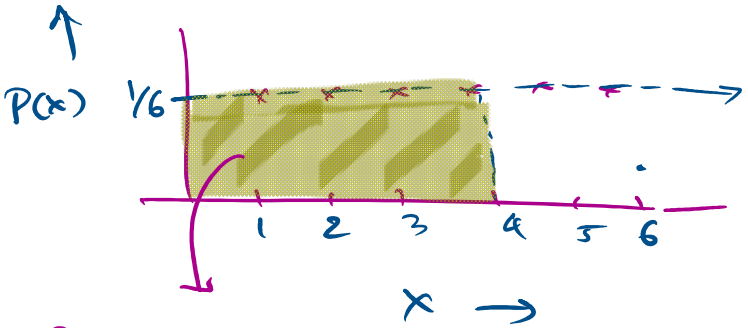
$P(X \leq 4)$ ⇒ CDF(4)

$= \sum_{i=1}^{i=4} P(x=i)$

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

$= 1/6 + 1/6 + 1/6 + 1/6$

$P(X \leq 4) = 4/6 = 2/3$

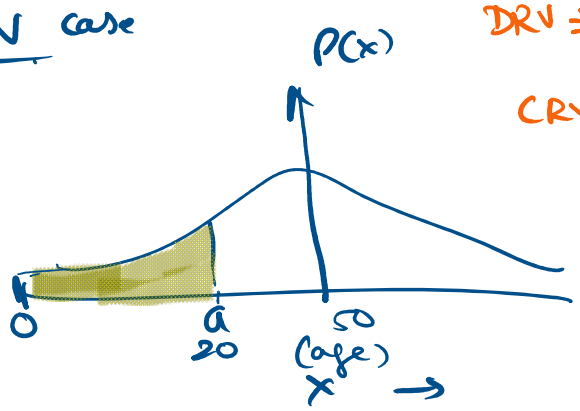


Area of this box = CDF(4) = $P(X \leq 4)$

CRV case

DRV ⇒ Summation Σ

CRV ⇒ Integral $\int$



What is the Prob that a randomly selected customer would have age $\leq$ 20 years ?

$$P(x \leq 20) = CDF(20) = \int_0^{20} P(x) \cdot dx$$

$\int$ → area under the curve from 0 to 20.