* Probability Distribution function and cumulative distribution function

① Pmf

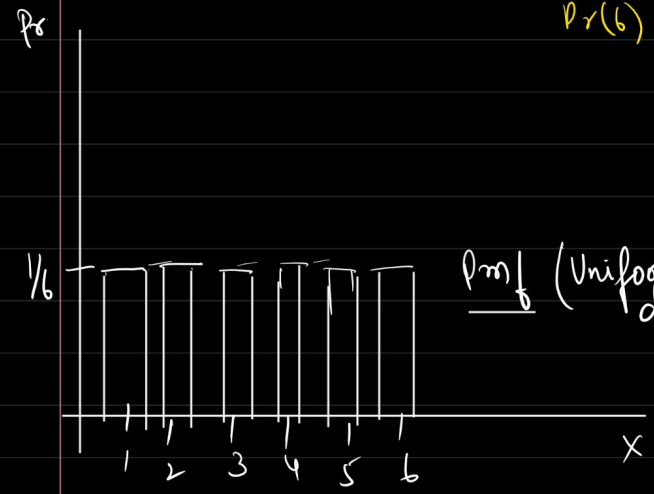
→ Discrete random variable.

→ Rolling a dice

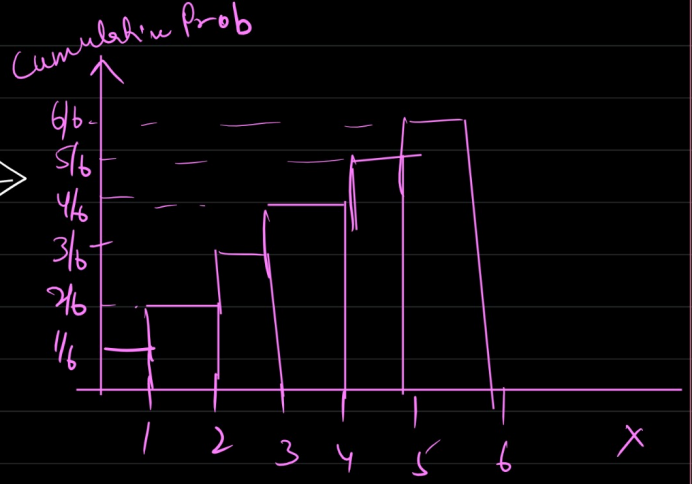
$\{1, 2, 3, 4, 5, 6\}$

$Pr(1) = 1/6$
$Pr(2) = 1/6$
$Pr(3) = 1/6$
$Pr(4) = 1/6$
$Pr(5) = 1/6$
$Pr(6) = 1/6$

} — Uniform distribution



Pmf (Uniform distribution)



$P(X \leq 1) = 1/6$

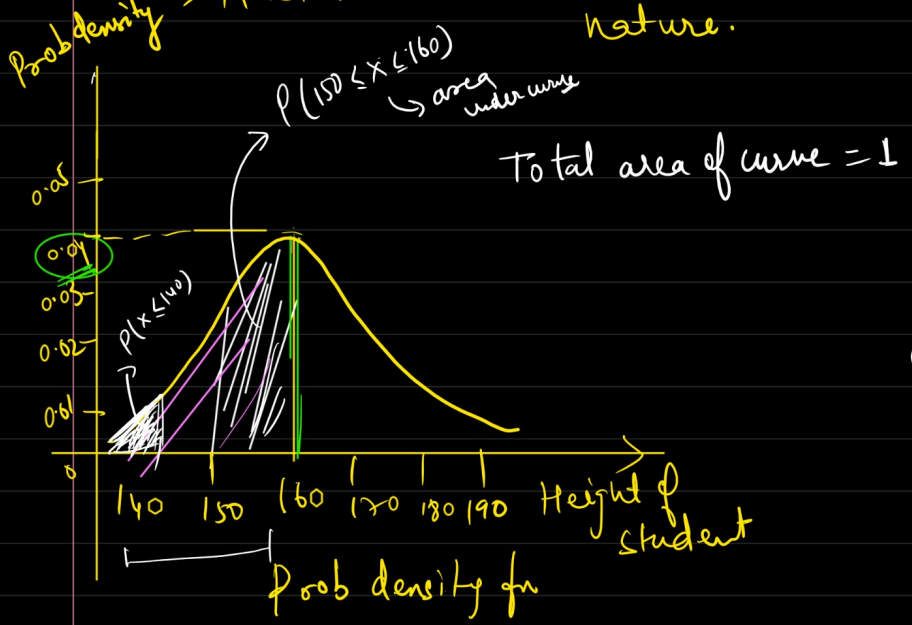
$P(X \leq 2) = P(X=1) + P(X=2)$
$= 1/6 + 1/6 = 2/6$

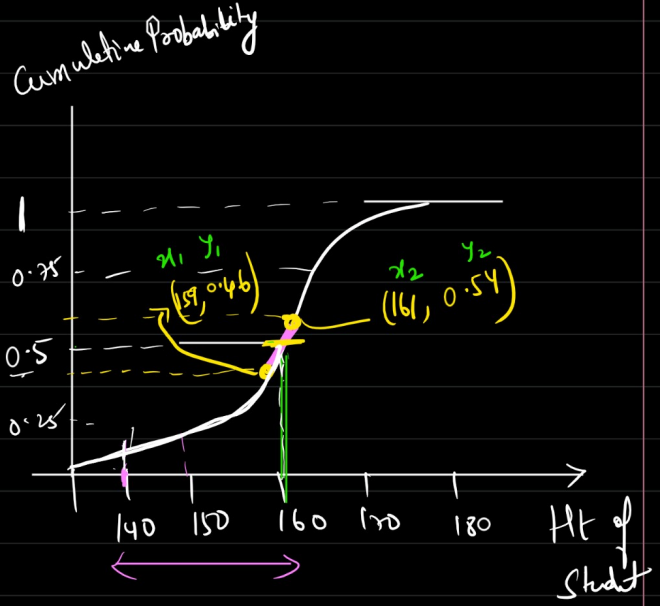
$P(X \leq 3) = P(X=1) + P(X=2) + P(X=3)$
$= 1/6 + 1/6 + 1/6 \Rightarrow 3/6$

$P(X \leq 6) = P(X=1) + P(X=2) + P(X=3) + P(X=4) + P(X=5) + P(X=6)$
$= 1/6 + 1/6 + 1/6 + 1/6 + 1/6 + 1/6$
$= 6/6 = 1$

② Prob density function (pdf)

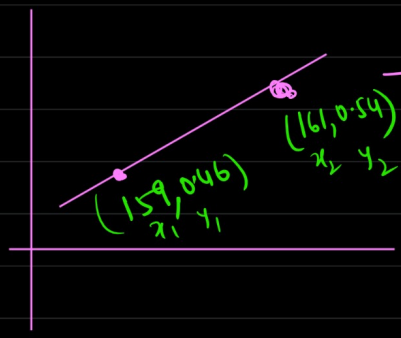
Prob density → Random variable is continuous in nature.





* Probability density of a pdf plot is the slope (gradient) of cdf at a given point.

*

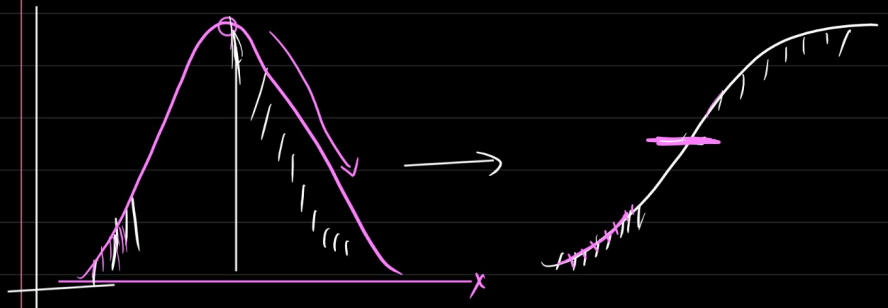


$$\rightarrow \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{0.54 - 0.46}{161 - 159}$$

$$= \frac{0.08}{2} \Rightarrow 0.04$$

Observation



→ Initially in pdf, since the changes are small, cdf slope will be also small (mind it slope of cdf curve & not cdf value), then will peak at 0.5 and again slope of cdf will decrease.

Q Can prob density > 1 ??