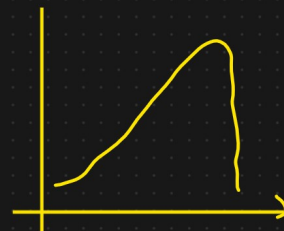
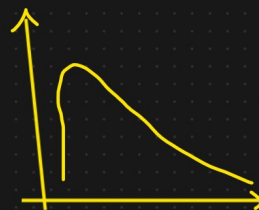
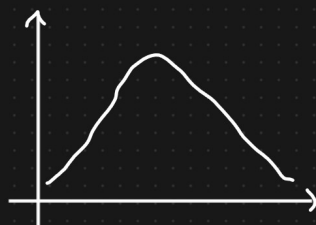
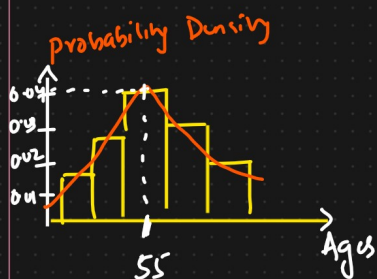


Probability Distribution Functions

Probability distribution functions describe how the probabilities are distributed over the values of a random variable.

$Agus = \{ - - - - - \} \Rightarrow$ Continuous random variable



2 Main of probability distribution functions

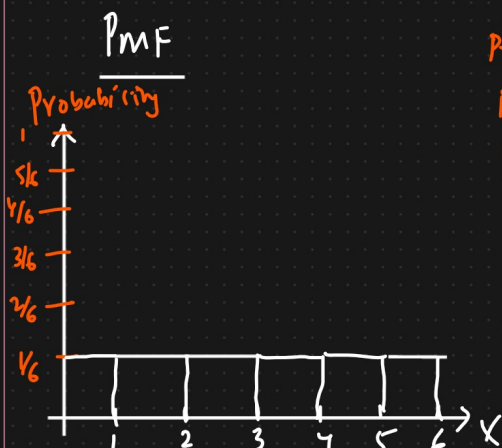
- ① Probability Mass functions (PMF) : Used for discrete random variables.
- ② Probability Density functions (PDF) : Used for continuous random variables
- ③ Cumulative Distribution function (cdf) \rightarrow is imp. to understand the pmf and pdf

① Probability Mass Function [Discrete Random Variable]

Eg: Rolling a dice $X = \{1, 2, 3, 4, 5, 6\} \Rightarrow$ Fair Dice

$$Pr(1) = Pr(2) = Pr(3) = Pr(4) = Pr(5) = Pr(6) = \frac{1}{6}$$

here we need to combine all the prob. as we go from 1 to 6



$$Pr(1) = \frac{1}{6}$$

$$Pr(2) = \frac{1}{6}$$

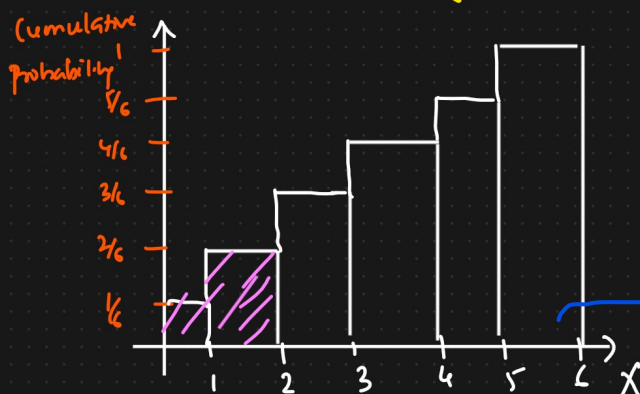
$$Pr(3) = \frac{1}{6}$$

$$\vdots$$

\Rightarrow

now:

Cumulative Density Function (cdf)



$$\begin{aligned} Pr(X \leq 2) &= Pr(X=1) + Pr(X=2) \\ &= \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3} \end{aligned}$$

$$\begin{aligned} Pr(X \leq 6) &= Pr(X=1) + Pr(X=2) \\ &\quad + \dots + Pr(X=6) \\ &= 1 \end{aligned}$$

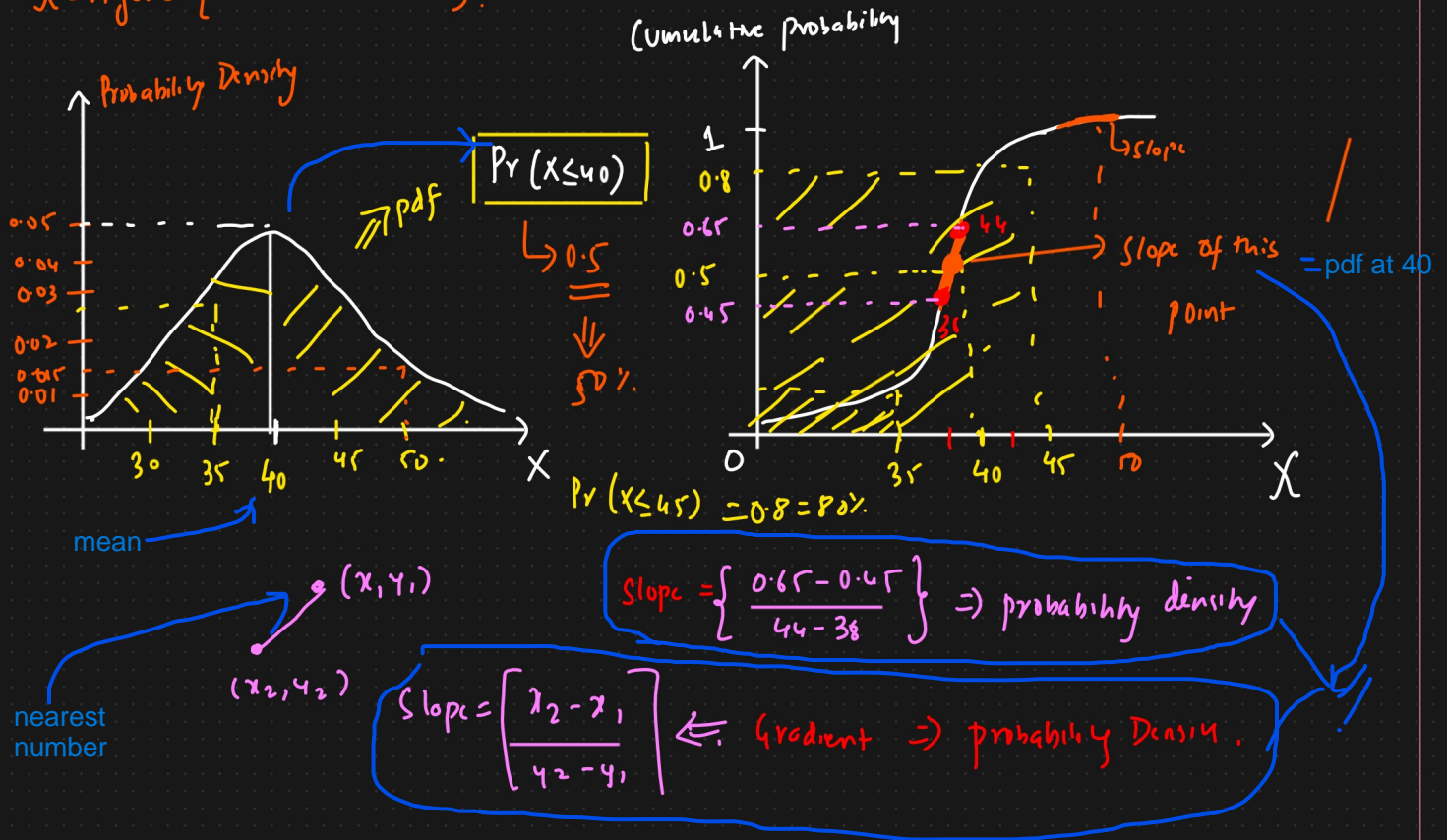
② Probability Density Function (pdf)

used for: ① Distribution of Continuous Random Variable

will discuss about:

- ① Area under the curve ✓
- ② Probability density ✓

$$X = \text{Age} = \{ \dots \}$$



Probability Density = Gradient of Cumulative Density function

PDF Properties

- ① ^{it is} Non Negativity $f(x) \geq 0$ for all x
- ② The total area under the PDF curve is equal to 1

$$\int_{-\infty}^{\infty} f(x) dx = 1$$



With respect to different distribution

$f(x)$ function is going to change



Different distribution types

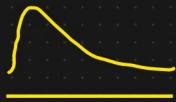
Types of Probability Distribution

[pdf, pmf, cdf]

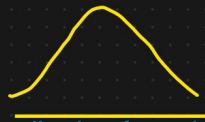
Ages, Weight, Salary



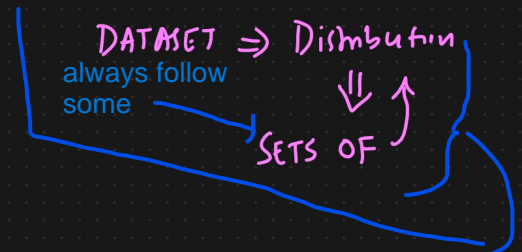
dist. for ages



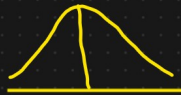
dist. for weight



distribution for salary



they are :

- ① Bernoulli Distribution \rightarrow Outcomes are binary (pmf) \Rightarrow Discrete Random Variable
- ② Binomial Distribution \rightarrow (pmf)
- ③ Normal/Gaussian Distribution \rightarrow (pdf) \Rightarrow  \Rightarrow Assumptions.
- ④ Poisson Distribution (pmf)
- ⑤ Log Normal Distribution (pdf)
- ⑥ Uniform Distribution (pmf)

Dataset \rightarrow House price prediction Dataset-

[EDA, FE] \Rightarrow DATA ANALYST
DATA SCIENTIST

Size of the house	No. of Rooms	Location	Floor	Sea Side	Price.
\downarrow	\downarrow	\downarrow	\downarrow	\downarrow	
Continuous random Variable	{ Discrete }		{ Discrete }	{ 0 & 1 }	Continuous
\downarrow			pmf	pmf	pdf
pdf.					