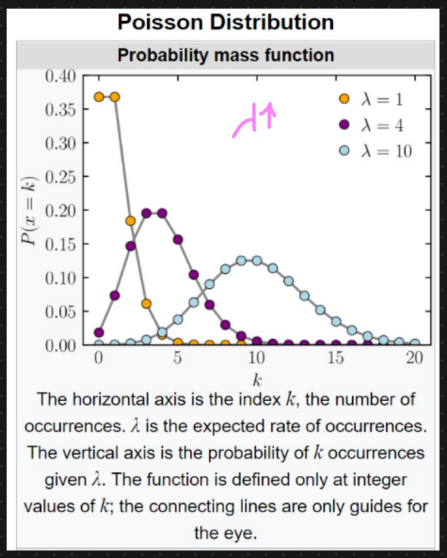
Poisson Distribution

In probability theory and statistics, the Poisson distribution is a discrete probability distribution that expresses the probability of a given number of events occurring in a fixed interval of time if these events occur with a known constant mean rate and independently of the time since the last event.



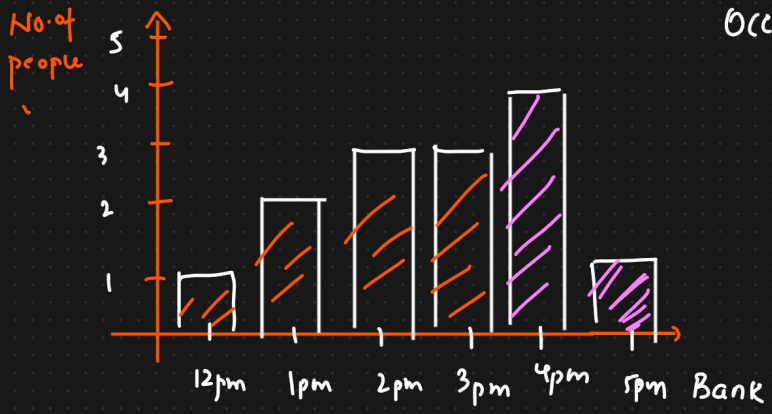
The horizontal axis is the index k, the number of occurrences. λ is the expected rate of occurrences. The vertical axis is the probability of k occurrences given λ. The function is defined only at integer values of k; the connecting lines are only guides for the eye.

for
① Discrete random variable → (pmf)

② Describes the numbers of events occuring in a fixed time intervals

Eg:- No. of people visiting hospital every hour
No. of people visiting banks every hour

$\lambda = 3$ ⇒ Expected no. of events occuring at every time interval



PMF

$\lambda = 3$

$$P(X=5) = \frac{e^{-\lambda} \lambda^{x}}{x!}$$

$$= \frac{e^{-3} 3^{5}}{5!} = 0.101 = 10.1\%$$

$Pr(X \leq 3)$

$Pr(X=4) + Pr(X=5) =$ final ⇒ probability

Mean of Poisson Distribution

λ = Expected No. of events occur at every time interval

t = Time interval

$$\text{Mean} = E(x) = \mu = \lambda * t$$

Variance → (same formula)