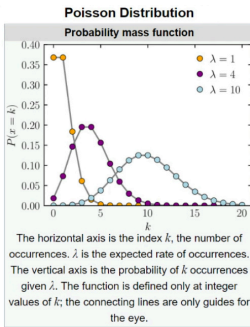


Poisson Distribution

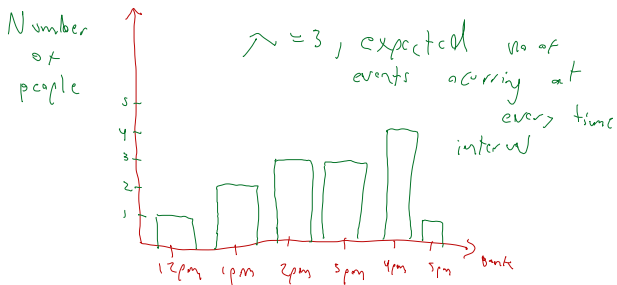
In probability theory and statistics, the **Poisson distribution** is a **discrete probability** distribution that express the probability of a given **number of events occurring in a fixed interval of time** if these events occur with a known constant mean rate and independently of the time since the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



1) Discrete random variable (pmf)

2) Distributes the number of events occurring in a fixed time interval

Example: Number of people visiting hospital every hour, No of people visiting banks every hour



PMF $P(X=5)$

The probability the person visit the bank 5pm

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

$\lambda = 3$ → Number of events occurring at every time interval

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

$$= 0.101 \rightarrow 0.1\% \rightarrow \text{The probability the person visit the bank 5pm}$$

The probability the person visit the bank 4pm and 5pm

$$Pr(X=4) + Pr(X=5) = \frac{e^{-3} 3^4}{4!} + 0.101$$

$$= 0.1680 + 0.101 = 0.269 \rightarrow 26.9\%$$

$$P(X \leq 3) = Pr(X=1) + Pr(X=2) + Pr(X=3)$$

Mean of poisson distribution

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

variance

λ = Expected No of events occurs at every time interval

t = Time interval