

# Poisson Distribution (only works for discrete)

Notation

- Unbounded  $\Rightarrow$  no upper limit on probability.

& Fundamentals

- Each event is independent & randomly occurs & discrete.

$$X \sim P_0(X) \quad \text{mean } (\lambda = \mu)$$

"The random variable  $X$  follows a poisson distribution with mean,  $\lambda$ "

$$P(X = x) = \frac{e^{-\lambda} \lambda^x}{x!} \quad (\text{the formula})$$

Key points

- For poisson: mode = median = mean  
& mean = variance /  $\sigma^2 = \lambda$   
- Reminder, this is only for "discrete".

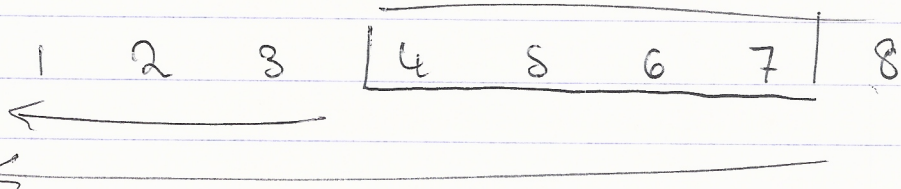
If the mean is 2.3 / s  $\Rightarrow$  the mean over 2s is 4.6.

Cumulative

$$P(X \leq 3) = P(X=0) + \dots + P(X=3)$$

- On the calculator CD is cumulative & DD is single.

$$P(X \leq X \leq 7) = P(X \leq 7) - P(X \leq 3)$$



Adding

If  $X \sim P(\lambda)$  &  $Y \sim P(\mu)$  & if independent  
 $\Rightarrow X + Y \sim P(\lambda + \mu)$