The Poisson Distribution

A discrete probability that applies to occurrences of some event over a specified interval

$$P(X) = \frac{\mu^x \cdot e^{-\mu}}{x!}$$

$$\mu = mean \quad (\lambda t)$$

$$\sigma = std.dev. = \sqrt{\mu}$$

-X is # of occurrences of an event over some interval
- occurrences must be random, independent, and uniformly distributed over interval being used

1. Find the probability (Using Formula)

Given λ = 3 and t = 5, find P(x =12)

2. Find the mean and standard deviation

Given λ = 5 and t = 10

TI-83/84 Function
(Under 2nd-Vars)
poissonpdf(mean,x)
and
poissoncdf(mean,x)

Finding Probabilities

1. Identify average number of occurrences of the event in some interval (λ, lambda) and number of intervals (t)
2. Calculate $\mu_X = \lambda t$
3. List the x values the problem entails and rewrite with inequality/equality symbols
4. Use the table on the following slide to determine how to enter the function

Forms

Form	TI-83/84 Function
$P(x = a)$	poissonpdf(μ_X,a)
$P(x \leq a)$	poissoncdf(μ_X,a)
$P(x \geq a)$	1-poissoncdf(μ_X,a-1)
$P(a \leq x \leq b)$	poissoncdf(μ_X,b)-poissoncdf(μ_X,a-1)

3. Examples

Given a poisson distribution with $\lambda = 2$ and $t = 5$, find the following:

a) P(exactly 8)
b) P(less than 17)
c) P(at most 12)
d) P(more than 20
e) P(at least 25)
f) P(between 10 and 20, inclusive)