# Introduction to Poisson Regression with Robust Standard Errors - Part 1

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# Goals of this Video

The goal is to cover the Poisson distribution

$\rightarrow$ If you have prior knowledge of the Poisson distribution, feel free to move ahead to the second video in which we will begin introducing the Poisson Regression model

# The Poisson Distribution

A random variable $Y$ is said to have a Poisson distribution with parameter $\lambda$ if its probability is given by the probability mass function

$$Pr(Y = y) = \frac{e^{-\lambda}\lambda^{y}}{y!}$$

for $\lambda > 0$ and y $= 0, 1, 2, \ldots$

# Expected Value and Variance

For a random variable $Y \sim Poisson(\lambda)$, the expected value (mean) and variance can be shown to be

$$E(Y) = Var(Y) = \lambda$$

Note: $E(Y)$ and $Var(Y)$ are equal to each other- this will be important to consider when we talk about regression!

# Uses for the Poisson Distribution

The Poisson distribution is used to describe random variables that give the count of some event per unit time, space, or other grouping

For example:

- $W =$ number of emergency phone alls per square kilometer in a region
- $X =$ number of accidents at an intersection per week
- $Y =$ number of births at a hospital per day

# In the Next Video

In the next video:

- Discuss how this distribution helps us model data
- Learn the theory behind the Poisson Regression Model