STATISTICAL DISTRIBUTION -2

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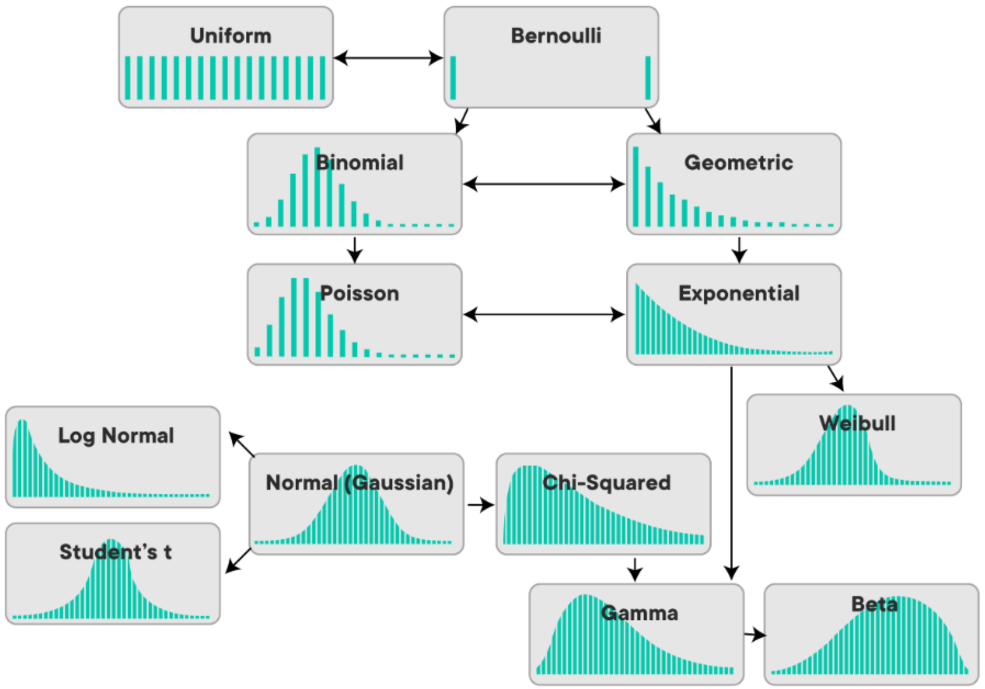


THE UNIFORM DISTRIBUTION

- Both discrete (Binomial) and continuous (Normal) distributions
- Describes an event where every possible outcome is equally likely
- Examples?

THE POISSON DISTRIBUTION

- Probability of a given event happening by examining the mean number of events that happen in a given time period

- Eg: Electricity bill daily

  An average of 20 customers walk into a store in a given hour. What is the probability that 25 customers walk into a store in the next hour?

This number is our $\lambda\lambda$ paramete

THE POISSON DISTRIBUTION

- Can we relate it to Binomial distribution?

- If we know that 6 customers walk into a store per hour, we also know enough to calculate the probability that a customer walks in during a given minute.

  (by just dividing the mean number of customers by the length of our interval!)

- λ parameter.

  λ = Expected number of successes over the time interval

THE POISSON DISTRIBUTION

$$p(x) = \frac{\lambda^x e^{-\lambda}}{x!}$$

- μ : The average number of successes over a given time period.

- x : Our random variable - the number of successes we want to find the probability mass of given our knowledge of μ

EXPONENTIAL DISTRIBUTIONS

- Describes the probability distribution of the amount of time it takes before an event occurs.

- Poisson Distribution lets you ask how likely **any given number of events are over a set interval of time**.

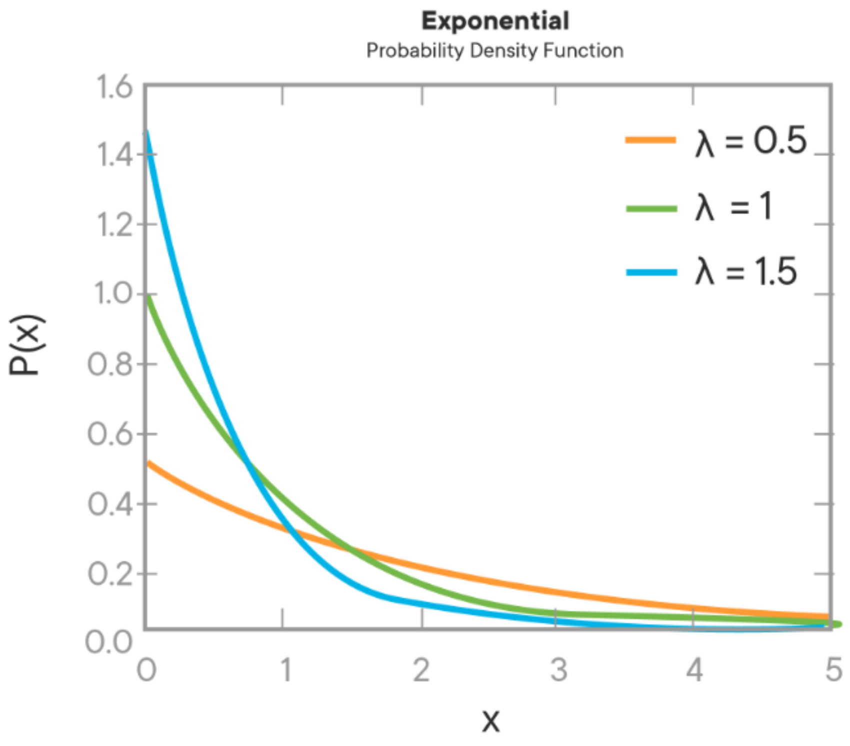
  The Exponential Distribution lets you ask how likely **the length of an interval of time is before an event occurs exactly once**

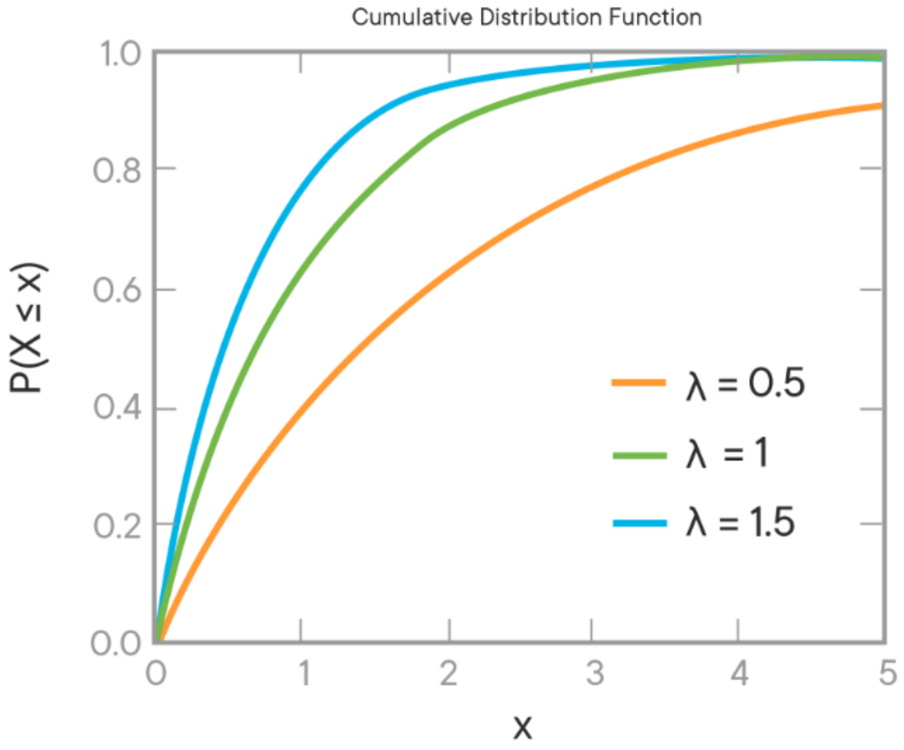
- Eg: How long will the next customer interaction take?

  How long before a sensor in this factory breaks down?

  How long until the next earthquake happens?

- Decay parameter $\lambda = \frac{1}{\mu}$
- "What is the probability that it takes exactly 4 minutes to ring up this customer?“ $PDF(x) = \lambda e^{-\lambda x}$
- Std = mean $\sigma = \mu$


Exponential
Probability Density Function
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
5
P(x)
x
λ = 0.5
λ = 1
λ = 1.5


Cumulative Distribution Function
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
5
P(X ≤ x)
x
λ = 0.5
λ = 1
λ = 1.5

CENTRAL LIMIT THEOREM

- Example: Asthma rates

DISCUSSION

THANK YOU!!