Poisson Test

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What is it?

- The Poisson distribution is used to model the probability that something will occur *k* number of times in an interval of time.
- This test calculates the probability model using the average event rate in the desired time interval
- Example:
  - Good: Probability that *k* number of goals will be scored in a world cup soccer match
  - Bad: The probability that *k* number of people will arrive at school per minute.
    - This is bad because there is an uneven distribution as most people arrive at school from 7:20-7:45 and will not typically arrive during other times of the day

Poisson Test Distribution Equation

- Formula for calculating probability
- In this case it is x events occurring not k events
- Lambda symbolizes average rate/occurrence

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

Assumptions/Criteria

- Independence – events are independent
- Rate is constant - known constant average rate for the interval
- K (number of times an event occurs in an interval) is greater than 0 (cant divide by zero
- Events do not occur simultaneously (technically they shouldn't occur close together in a time interval)

How To Use the Test

- Possible tools to use for the test
  - Mathematica
  - Excel
- How to store data
  - Store data with just numbers
  - Labels can be with the headers
- Data that you need
  - The average number of times an event occurs in an interval of time
- Data you will get from the test
  - The probability that an event will occur a certain number of times in the next time interval.

Poisson Test Example

- https://wpi0-my.sharepoint.com/:x:/g/personal/brheggadahalli_wpi_edu/EUKrL74-rvJLISYhXbT7ZgwBfvNB_Ey0o5_Fq8lmyok54w?e=T0gvh7