Exponential Example:

The average time to get to a Disney ride during peak hours follows a Exponential Distribution.

\[ M = \text{time to stand in line} = 22 \text{ minutes} \]

Cumulative Exponential Formula:

\[ F(x) = 1 - e^{-x/M} \]

\[ x = \text{particular } x \]
\[ M = \text{mean} \]
\[ e = 2.7182 \]

Probability stand in line for 15 or less

\[ P(x \leq 15) = 1 - e^{-15/22} = 0.494303 \]

\[ P(x \leq 15) = \text{EXPON.DIST}(15, 1/22, 1) = 0.494303 \]

Probability stand in line for 25 minutes or more

\[ P(x \geq 25) = e^{-25/22} = 0.32098417 \]

\[ = 1 - \text{EXPON.DIST}(25, 1/22, 1) = 0.32098 \]

\[ P(15 \leq x \leq 25) = \text{EXPON.DIST}(25, 1/22, 1) - \text{EXPON.DIST}(15, 1/22, 1) \]

\[ = 0.1847 \]

Area between 2 \( \Rightarrow \) Big Area - Small Area
Exponential Probability Distribution

useful in computing probabilities for the time it takes to complete a task or distance between similar occurrences.

Examples:
* Time between arrivals at car wash
* Time to take a test
* Distance between potholes on a road

Exponential Density Function

\[ f(x) = \frac{1}{\lambda} e^{-x/\lambda} \quad \text{for } x \geq 0, \lambda > 0 \]

Property of Exponential Dist. \[ \lambda = \text{mean} = \sigma = \text{standard deviation} \]

\[ e \approx 2.71828 = \text{EXP}(1) \text{ in Excel} \]

Exponential cumulative Probabilities

\[ P(X \leq x_0) = 1 - e^{-x_0/\lambda} \]

\( x_0 \) = particular \( x \)

EXPDIST Function

\[ = \text{EXPON.DIST}(x, \frac{1}{\lambda}, \text{cumulative}) \]

called "lambda"

Excel 2010 Dot

1 or TRUE to get cumulative from 0 to \( x \)
0 or FALSE to get height

Continuous Random Variable Probability Distribution → Find Area Between 2 \( x \) values