

# Normal Distribution

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Case Studies  
"Data Analytics"

# Outline

## ① Introduction

- ▶ Normality as a requirement for statistical methods
- ▶ Data Set Overview

## ② Normality Testing

- ▶ Graphical Methods for Normality Testing
  - ★ Q-Q-Plots
  - ★ Chi-Square Plot
- ▶ Quantitative Methods for Normality Testing
  - ★ Shapiro-Wilk Test
  - ★ Pearson's Chi-Squared Test
  - ★ Kolmogorov-Smirnov Test

## ③ Transformation to Normality

- ▶ Box-Cox Transformation
- ▶ Transformation Results Testing

## ④ Summary

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## Shapiro-Wilk Test



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## Pearson's Chi-Squared Test

# Quantitative Methods for Normality Testing

## Kolmogorov-Smirnov Test

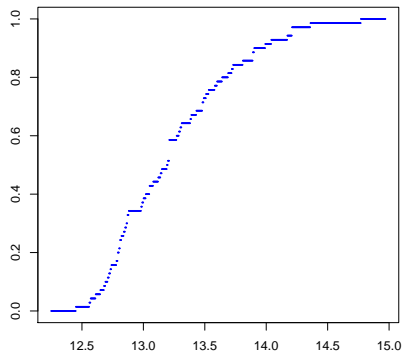
Let  $x = (x_1, x_2, \dots, x_n)$  be a sample of a given size  $n$ .

### Definition

$F_n = \frac{1}{n} \sum_{i=1}^n \mathbb{1}_{\{x_i \leq x\}}$  - empirical

c. d. f. , where  $\forall x \in \mathbb{R}$

$$\mathbb{1}_{\{x_i \leq x\}}(x) = \begin{cases} 1 & \text{if } x_i \leq x \\ 0 & \text{otherwise.} \end{cases}$$



Glass Type 1, Natrium (Na)

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