



Lean Six Sigma Green Belt

3.5 HYPOTHESIS TESTING WITH NON-NORMAL
DATA



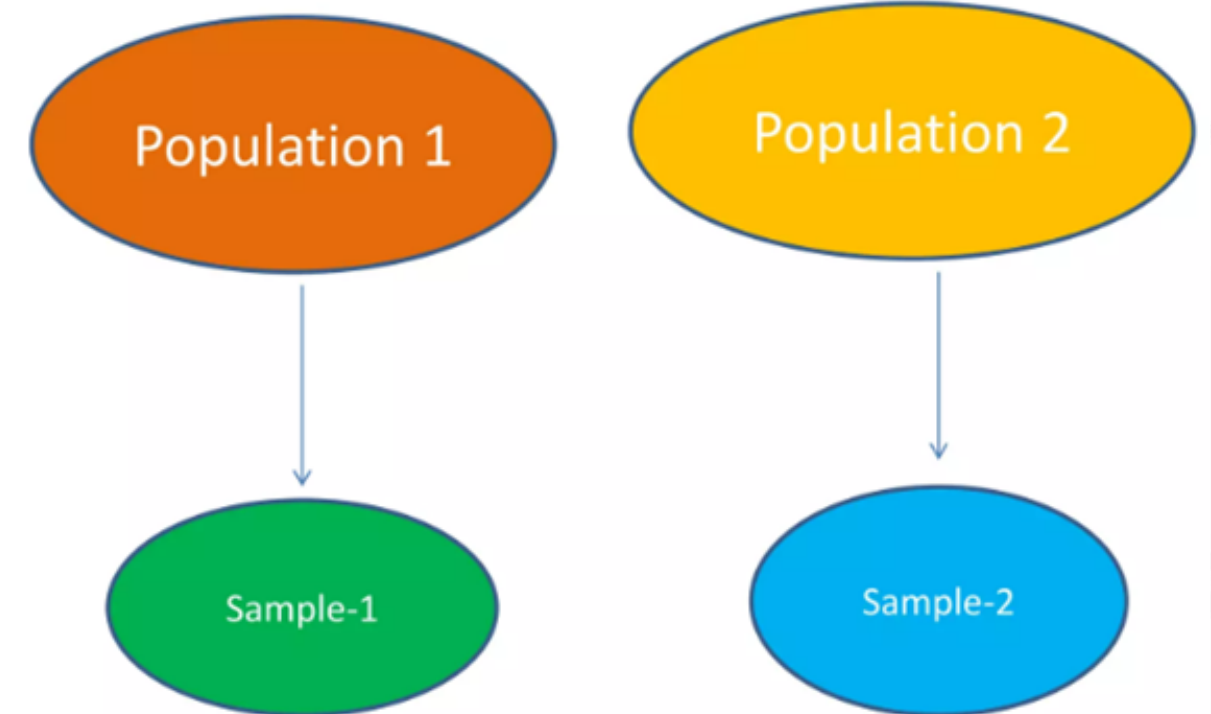
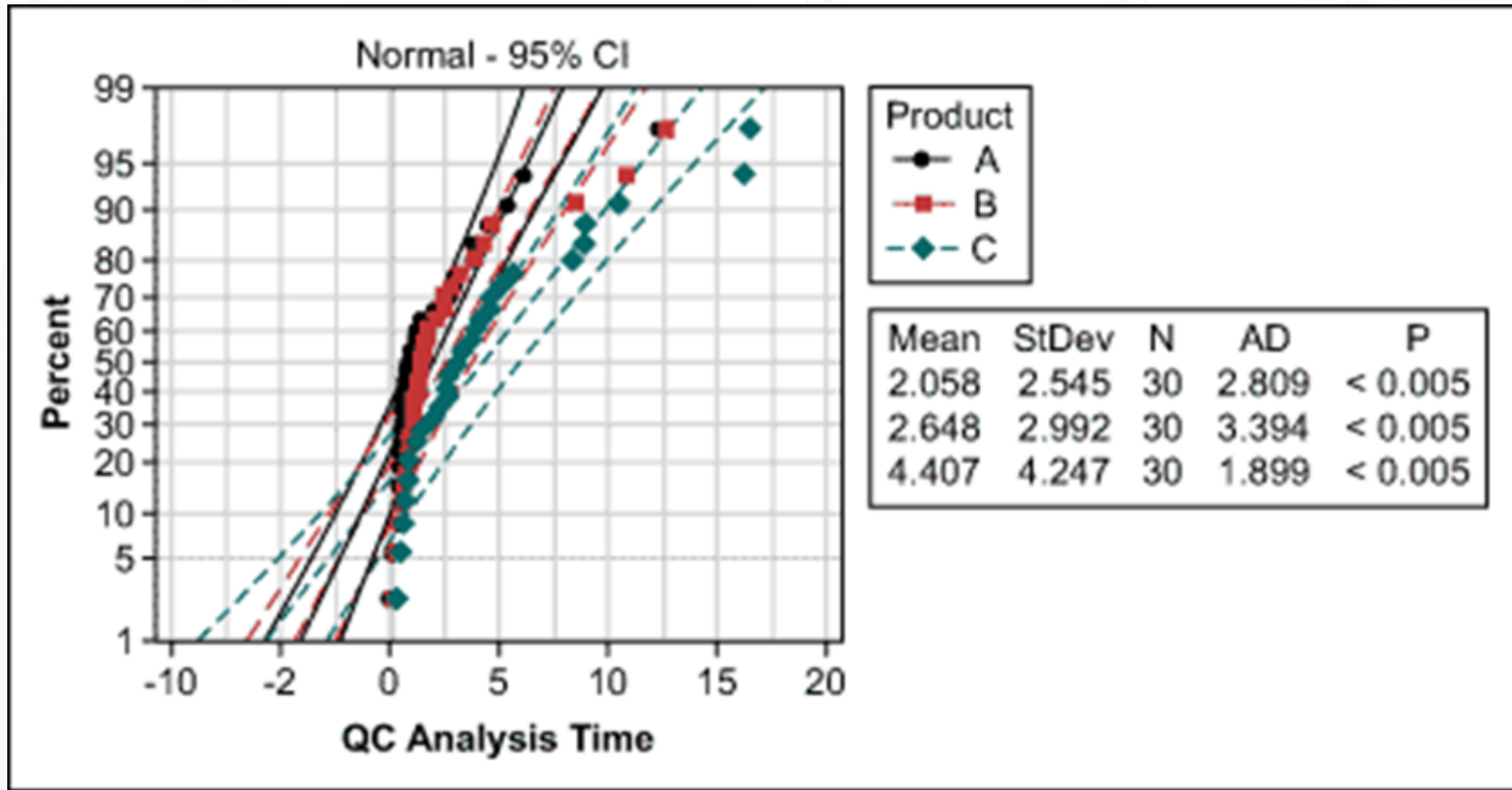
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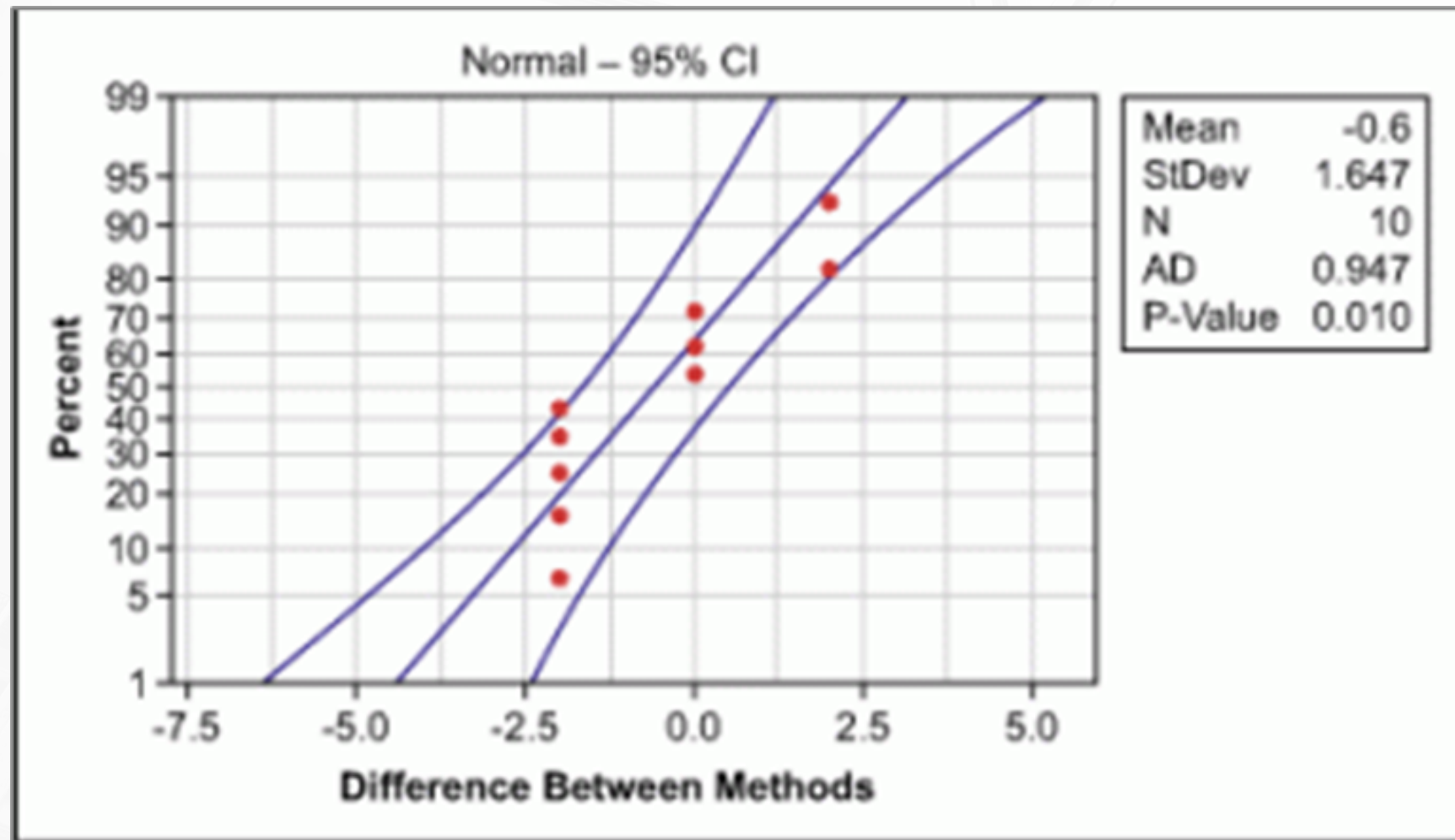
Mood's Median Test

- MOOD'S MEDIAN HYPOTHESIS TEST
- ASSUMPTIONS OF THE MOOD'S MEDIAN TEST
- USES OF MOOD'S MEDIAN TEST

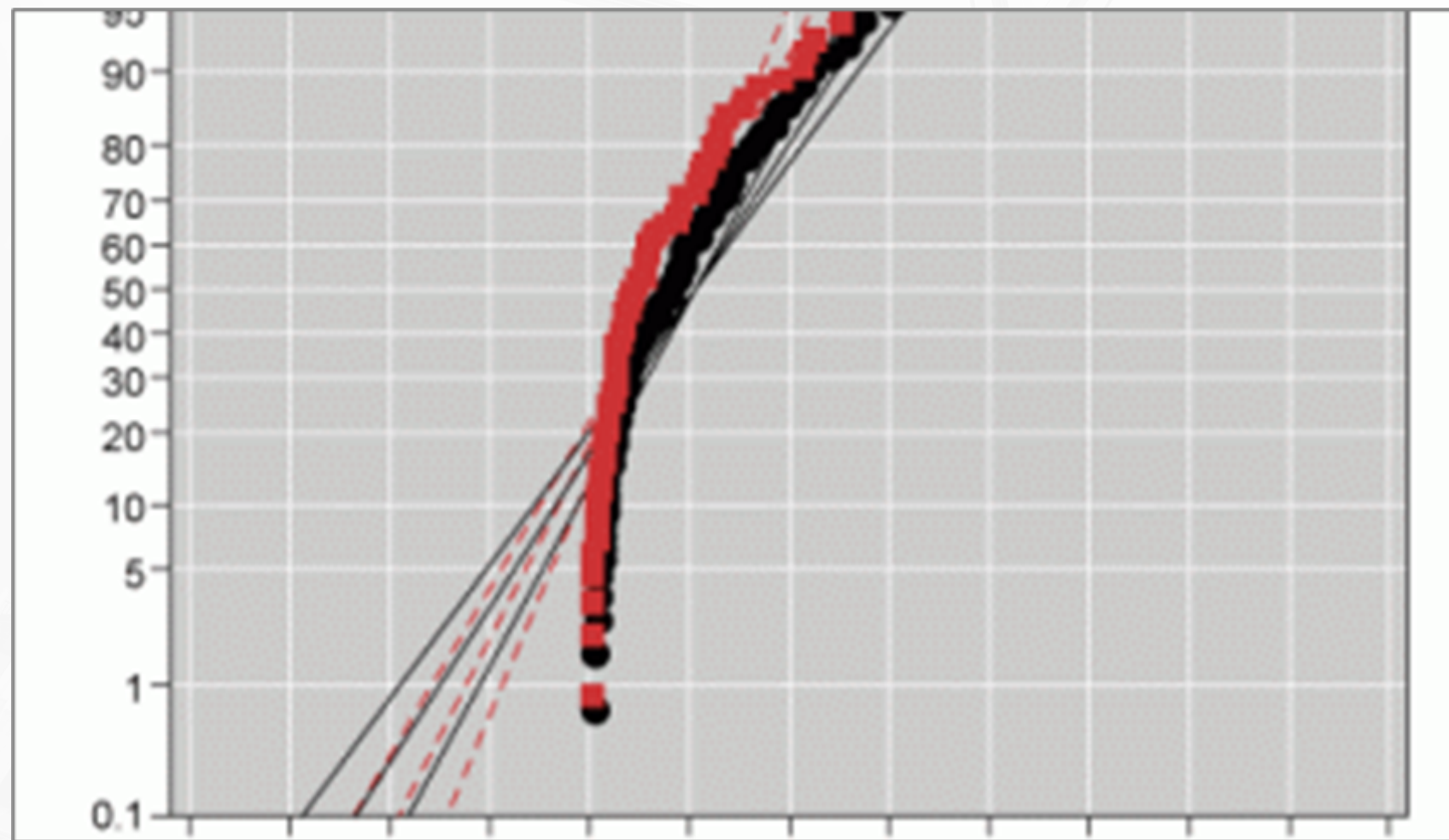
Mood's Median hypothesis Test

- Mood's median test is used to compare the medians for two samples drawn from different populations to find out if they are different.
- Example: you might want to compare the median number of positive calls to a hotline vs. the median number of negative comment calls
- The objective is to find out if you are getting significantly more negative comments than positive comments (or vice versa).





- Mood's median test is a non-parametric test that is used to compare the medians of two independent samples.
 - It is also used to estimate whether the median of any two independent samples are equal.
 - Therefore, Mood's test is an alternative to the one-way ANOVA
- This test works when:
 - The dependent variable is continuous or discrete-count
 - The independent variables are discrete with two or more attributes.
- Mood's median test is a primitive two sample version of sign test.
 - It can be applied for more than two samples
 - It is not as powerful as Kruskal Wallis test.



- While Mood's median test is more useful for smaller sample sizes, when the data contains few outliers
 - The test focuses on median value instead of ranks.
- Usually, the researchers prefer the Wilcoxon Rank Sum test or Mann-Whitney U test
 - They provide more robust results when compared to Mood's Median Test.
- The Mood's median test compares whether k independent samples have been drawn either from the same population or from populations with equal medians.

Assumptions of the Mood's Median Test

- Observations are independent both within and between samples.
- Observations come from population with continuous distribution function
- The distributions of the populations, the samples were drawn from, have the same shape.

Mood's Median Test: Overall Satisfaction versus Customer Type

Descriptive Statistics

Customer Type	Median	N <= Overall Median	N > Overall Median	Q3 - Q1	95% Median CI
1	3.560	21	10	1.2100	(2.95350, 3.93624)
2	4.340	12	30	0.8975	(4.09464, 4.51841)
3	3.510	17	10	0.9300	(3.28911, 4.02267)
Overall	3.945				

Test

Null hypothesis H_0 : The population medians are all equal
Alternative hypothesis H_1 : The population medians are not all equal

DF	Chi-Square	P-Value
2	13.43	0.001

Uses of Mood's Median Test

- Following are examples regarding where the Mood's median test can be used:
 - To compare the medians of customer satisfaction level (dependent variable) of different account holders (independent variables: current account and savings account customers).
 - To compare the medians of machining times of different production lines in a manufacturing plant (Line 1, 2, and 3).

Mood's Median Test: Sales_2 versus City_2

Descriptive Statistics

City_2	Median	N <= Overall Median	N > Overall Median	Q3 - Q1	95% Median CI
1	18.5	4	6	16.75	(13.3153, 31.4505)
2	14.0	6	4	8.75	(9.65766, 18.6847)
3	16.0	4	6	11.00	(12.3153, 23.6847)
4	12.0	6	4	10.75	(8.65766, 19.6847)
Overall	15.5				

Test

Null hypothesis

H₀: The population medians are all equal

Alternative hypothesis

H₁: The population medians are not all equal

DF	Chi-Square	P-Value
3	1.60	0.659