

Significance Level and Risk

**Data Science for Quality Management:
Two Sample Hypothesis Testing
with Wendy Martin**

Learning objective:

Interpret significance level and risk

Alpha Level and Risk

- Alpha, α , is a selection of risk that you are willing to take
- Given a true null hypothesis, α is the probability the null hypothesis could be rejected

Alpha Level and Risk

- The smaller the selected level of α , the smaller the probability of rejecting a true null hypothesis
- The researcher selects this risk value

p Value

- The significance level, or p-value, is the probability that an observed statistic, or one that is more extreme, could have occurred by chance, given a true null hypothesis

p Value

- The p-value is generated from calculation in statistical tests and is directly compared to α
- We will reject a null hypothesis if the p-value is less than or equal to the selected level of α

Test Statistics

In hypothesis testing we:

- Take samples
- Calculate sample statistics
- Calculate test statistics
- Calculate probabilities (significance) using the test statistics

Test Statistics

- Some important test statistics include:
 - z , t , χ^2 , and F
- Probabilities of test statistics can be approximate or in some cases exact, and require underlying assumptions are met

Sources

- Luftig, J. An Introduction to Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1982