



Quality Trainer

CONTENT OUTLINE

Chapter 1: Descriptive Statistics and Graphical Analysis

1.1 Introduction

- 1.1.1 Learning Objectives

1.2 Types of Data

- 1.2.1 Basic Concepts
- 1.2.2 Data Types
- 1.2.3 Quiz: Types of Data

1.3 Using Graphs to Analyze Data

- 1.3.1 Basic Concepts
- 1.3.2 Bar Charts and Pareto Charts
- 1.3.3 Pie Charts
- 1.3.4 Histograms
- 1.3.5 Dotplots
- 1.3.6 Individual Value Plots
- 1.3.7 Boxplots
- 1.3.8 Time Series Plots
- 1.3.9 Quiz: Using Graphs to Analyze Data
- 1.3.10 Minitab Tools: Bar Chart
- 1.3.11 Minitab Tools: Pie Chart
- 1.3.12 Minitab Tools: Histogram
- 1.3.13 Minitab Tools: Dotplot
- 1.3.14 Minitab Tools: Individual Value Plot
- 1.3.15 Minitab Tools: Boxplot
- 1.3.16 Minitab Tools: Times Series Plot
- 1.3.17 Exercise: Graphical Analysis

1.4 Using Statistics to Analyze Data

- 1.4.1 Basic Concepts
- 1.4.2 Mean and Median
- 1.4.3 Range, Variance, and Standard Deviation
- 1.4.4 Quiz: Using Statistics to Analyze Data
- 1.4.5 Minitab Tools: Display Descriptive Statistics
- 1.4.6 Exercise: Descriptive Statistics

1.5 Summary

- 1.5.1 Objectives Review

Chapter 2: Statistical Inference

2.1 Introduction

- 2.1.1 Learning Objectives

2.2 Fundamentals of Statistical Inference

- 2.2.1 Basic Concepts
- 2.2.2 Random Samples
- 2.2.3 Quiz: Fundamentals of Statistical Inference
- 2.2.4 Minitab Tools: Random Sampling

2.3 Sampling Distributions

- 2.3.1 Basic Concepts
- 2.3.2 Sampling Distribution of the Mean
- 2.3.3 Quiz: Sampling Distributions

2.4 Normal Distribution

- 2.4.1 Basic Concepts
- 2.4.2 Probabilities Associated with a Normal Distribution
- 2.4.3 Probabilities Associated with the Sample Mean
- 2.4.4 Quiz: Normal Distribution
- 2.4.5 Minitab Tools: Cumulative Probabilities with a Normal Distribution
- 2.4.6 Exercise: Probabilities and Normal Distributions

2.5 Summary

- 2.5.1 Objectives Review

Chapter 3: Hypothesis Tests and Confidence Intervals

3.1 Introduction

- 3.1.1 Learning Objectives

3.2 Tests and Confidence Intervals

- 3.2.1 Confidence Intervals
- 3.2.2 Hypothesis Testing
- 3.2.3 Using Hypothesis Testing to Make Decisions
- 3.2.4 Type I and Type II Errors and Power
- 3.2.5 Quiz: Tests and Confidence Intervals

3.3 1-Sample t-Test

- 3.3.1 Basic Concepts
- 3.3.2 Individual Value Plots
- 3.3.3 1-Sample t-Test Results
- 3.3.4 Assumptions
- 3.3.5 Quiz: 1-Sample t-Test
- 3.3.6 Minitab Tools: 1-Sample t-Test
- 3.3.7 Exercise: 1-Sample t-Test

Learn how Minitab can help you improve quality at www.minitab.com.

3.4 2 Variances Test

- 3.4.1 Basic Concepts
- 3.4.2 Boxplots
- 3.4.3 2 Variances Test Results
- 3.4.4 Assumptions
- 3.4.5 Quiz: 2 Variances Test
- 3.4.6 Minitab Tools: 2 Variances Test
- 3.4.7 Exercise: 2 Variances Test

3.5 2-Sample t-Test

- 3.5.1 Basic Concepts
- 3.5.2 Individual Value Plot
- 3.5.3 2-Sample t-Test Results
- 3.5.4 Assumptions
- 3.5.5 Quiz: 2-Sample t-Test
- 3.5.6 Minitab Tools: 2-Sample t-Test
- 3.5.7 Exercise: 2-Sample t-Test

3.6 Paired t-Test

- 3.6.1 Basic Concepts
- 3.6.2 Individual Value Plots
- 3.6.3 Paired t-Test Results
- 3.6.4 Assumptions
- 3.6.5 Quiz: Paired t-Test
- 3.6.6 Minitab Tools: Paired t-Test
- 3.6.7 Exercise: Paired t-Test

3.7 1 Proportion Test

- 3.7.1 Basic Concepts
- 3.7.2 1 Proportion Test Results
- 3.7.3 Assumptions
- 3.7.4 Quiz: 1 Proportion Test
- 3.7.5 Minitab Tools: 1 Proportion Test
- 3.7.6 Exercise: 1 Proportion Test

3.8 2 Proportions Test

- 3.8.1 Basic Concepts
- 3.8.2 2 Proportions Test Results
- 3.8.3 Assumptions
- 3.8.4 Quiz: 2 Proportions Test
- 3.8.5 Minitab Tools: 2 Proportions Test
- 3.8.6 Exercise: 2 Proportions Test

3.9 Chi-Square Test

- 3.9.1 Basic Concepts
- 3.9.2 Chi-Square Test Results
- 3.9.3 Assumptions
- 3.9.4 Quiz: Chi-Square Test
- 3.9.5 Minitab Tools: Chi-Square Test
- 3.9.6 Exercise: Chi-Square Test

3.10 Summary

- 3.10.1 Objectives Review

Chapter 4: Control Charts

4.1 Introduction

- 4.1.1 Learning Objectives

4.2 Statistical Process Control

- 4.2.1 Basic Concepts
- 4.2.2 Patterns in Control Charts
- 4.2.3 Quiz: Statistical Process Control

4.3 Control Charts for Variables Data in Subgroups

- 4.3.1 Basic Concepts
- 4.3.2 R Charts
- 4.3.3 S Charts
- 4.3.4 Xbar Charts
- 4.3.5 Quiz: Control Charts for Variables Data in Subgroups
- 4.3.6 Minitab Tools: Xbar-R Chart
- 4.3.7 Exercise: Xbar-R Chart

4.4 Control Charts for Individual Observations

- 4.4.1 Basic Concepts
- 4.4.2 Moving Range Charts
- 4.4.3 Individuals Charts
- 4.4.4 Quiz: Control Charts for Individual Observations
- 4.4.5 Minitab Tools: I-MR Chart
- 4.4.6 Exercise: I-MR Chart

4.5 Control Charts for Attribute Data

- 4.5.1 Basic Concepts
- 4.5.2 NP and P Charts
- 4.5.3 C and U Charts
- 4.5.4 Quiz: Control Charts for Attributes Data
- 4.5.5 Minitab Tools: P Chart
- 4.5.6 Exercise: P Chart

4.6 Summary

- 4.6.1 Objectives Review

Chapter 5: Process Capability

5.1 Introduction

- 5.1.1 Learning Objectives

5.2 Process Capability for Normal Data

- 5.2.1 Basic Concepts
- 5.2.2 Assumptions
- 5.2.3 Testing for Normality
- 5.2.4 Quiz: Process Capability for Normal Data
- 5.2.5 Minitab Tools: Normality Test
- 5.2.6 Exercise: Assumptions for Process Capability

5.3 Capability Indices

- 5.3.1 Potential Capability: Cp and Cpk
 - 5.3.2 Process Performance: Pp and Ppk
 - 5.3.3 Sigma Level
 - 5.3.4 Quiz: Capability Indices
 - 5.3.5 Minitab Tools: Cp and Pp
 - 5.3.6 Minitab Tools: Sigma Level
 - 5.3.7 Exercise: Process Capability for Normal Data
-

5.4 Process Capability for Nonnormal Data

- 5.4.1 Transformations and Alternate Distributions
- 5.4.2 Box-Cox Transformation
- 5.4.3 Johnson Transformation
- 5.4.4 Alternate Distributions
- 5.4.5 Quiz: Process Capability for Nonnormal Data
- 5.4.6 Minitab Tools: Box-Cox Transformation
- 5.4.7 Minitab Tools: Johnson Transformation
- 5.4.8 Minitab Tools: Capability Analysis with Johnson Transformation
- 5.4.9 Minitab Tools: Alternate Distributions
- 5.4.10 Minitab Tools: Capability Analysis with Alternate Distributions
- 5.4.11 Exercise: Process Capability with Data Transformations
- 5.4.12 Exercise: Process Capability with Alternate Distributions

5.5 Summary

- 5.5.1 Objectives Review

Chapter 6: Analysis of Variance (ANOVA)

6.1 Introduction

- 6.1.1 Learning Objectives

6.2 Fundamentals of ANOVA

- 6.2.1 Basic Concepts
- 6.2.2 Graphs and Summary Statistics
- 6.2.3 Quiz: Fundamentals of ANOVA

6.3 One-Way ANOVA

- 6.3.1 Hypothesis Tests
- 6.3.2 F-Statistics and P-Values
- 6.3.3 Multiple Comparisons
- 6.3.4 Assumptions and Residual Plots
- 6.3.5 Quiz: One-Way ANOVA
- 6.3.6 Minitab Tools: One-Way ANOVA
- 6.3.7 Exercise: One-Way ANOVA

6.4 Two-Way ANOVA

- 6.4.1 Basic Concepts
- 6.4.2 Graphs
- 6.4.3 Hypothesis Tests
- 6.4.4 F-Statistics and P-Values
- 6.4.5 Assumptions and Residual Plots
- 6.4.6 Quiz: Two-Way ANOVA
- 6.4.7 Minitab Tools: Two-Way ANOVA
- 6.4.8 Exercise: Two-Way ANOVA

6.5 Summary

- 6.5.1 Summary of ANOVA

Chapter 7: Correlation and Regression

7.1 Introduction

- 7.1.1 Learning Objectives

7.2 Relationship Between Two Quantitative Variables

- 7.2.1 Basic Concepts
- 7.2.2 Scatterplot
- 7.2.3 Correlation
- 7.2.4 Quiz: Relationship Between Two Quantitative Variables
- 7.2.5 Minitab Tools: Scatterplot
- 7.2.6 Minitab Tools: Correlation
- 7.2.7 Exercise: Scatterplots and Correlation

7.3 Simple Regression

- 7.3.1 Basic Concepts
- 7.3.2 Regression
- 7.3.3 Hypothesis Tests and R^2
- 7.3.4 Assumptions and Residual Plots
- 7.3.5 Quiz: Simple Regression
- 7.3.6 Minitab Tools: Simple Regression
- 7.3.7 Exercise: Simple Regression

7.4 Summary

- 7.4.1 Objectives Review

Chapter 8: Measurement Systems Analysis

8.1 Introduction

- 8.1.1 Learning Objectives

8.2 Fundamentals of Measurement Systems Analysis

- 8.2.1 Basic Concepts
- 8.2.2 Accuracy
- 8.2.3 Precision
- 8.2.4 Comparing Accuracy and Precision
- 8.2.5 Quiz: Fundamentals of Measurement Systems Analysis

8.3 Repeatability and Reproducibility

- 8.3.1 Basic Concepts
- 8.3.2 Gage R&R Studies
- 8.3.3 Quiz: Repeatability and Reproducibility

8.4 Graphical Analysis of a Gage R&R Study

- 8.4.1 Basic Concepts
 - 8.4.2 Components of Variation
 - 8.4.3 Xbar and R Charts
 - 8.4.4 Interaction between Operator and Part
 - 8.4.5 Comparative Plots
 - 8.4.6 Gage Run Charts
 - 8.4.7 Quiz: Graphical Analysis of a Gage R&R Study
 - 8.4.8 Minitab Tools: Crossed Gage R&R Study
 - 8.4.9 Minitab Tools: Gage Run Chart
 - 8.4.10 Exercise: Graphical Analysis of a Gage R&R Study
-

8.5 Variation

- 8.5.1 Standard Deviation and Study Variation
- 8.5.2 Tolerance
- 8.5.3 Process Variation
- 8.5.4 Quiz: Variation
- 8.5.5 Exercise: Numerical Analysis of a Gage R&R Study

8.6 ANOVA with a Gage R&R Study

- 8.6.1 Variance Components
- 8.6.2 Analysis of Variance Tables
- 8.6.3 Quiz: ANOVA with a Gage R&R Study
- 8.6.4 Exercise: ANOVA Output for a Gage R&R Study

8.7 Gage Linearity and Bias Study

- 8.7.1 Basic Concepts
- 8.7.2 Gage Linearity
- 8.7.3 Gage Bias
- 8.7.4 Quiz: Gage Linearity and Bias Study
- 8.7.5 Minitab Tools: Gage Linearity and Bias Study
- 8.7.6 Exercise: Gage Linearity and Bias Study

8.8 Attribute Agreement Analysis

- 8.8.1 Basic Concepts
- 8.8.2 Binary Data
- 8.8.3 Nominal Data
- 8.8.4 Ordinal Data
- 8.8.5 Quiz: Attribute Agreement Analysis
- 8.8.6 Minitab Tools: Attribute Agreement Analysis with Binary Data
- 8.8.7 Minitab Tools: Attribute Agreement Analysis with Nominal Data
- 8.8.8 Minitab Tools: Attribute Agreement Analysis with Ordinal Data
- 8.8.9 Exercise: Attribute Agreement Analysis

8.9 Summary

- 8.9.1 Objectives Review

Chapter 9: Design of Experiments

9.1 Introduction

- 9.1.1 Learning Objectives

9.2 Factorial Designs

- 9.2.1 Basic Concepts
- 9.2.2 Creating Full Factorial Designs
- 9.2.3 Analyzing Full Factorial Designs

- 9.2.4 Quiz: Factorial Designs
- 9.2.5 Minitab Tools: Create a Full Factorial Design
- 9.2.6 Minitab Tools: Analyze a Full Factorial Design
- 9.2.7 Exercise: Create a Full Factorial Design
- 9.2.8 Exercise: Analyze a Full Factorial Design

9.3 Blocking and Incorporating Center Points

- 9.3.1 Blocking
- 9.3.2 Center Points
- 9.3.3 Analyzing Designs with Blocks and Center Points
- 9.3.4 Quiz: Blocking and Incorporating Center Points
- 9.3.5 Minitab Tools: Create a Factorial Design with Blocks and Center Points
- 9.3.6 Minitab Tools: Analyze a Factorial Design with Blocks and Center Points
- 9.3.7 Exercise: Create a Factorial Design with Blocks and Center Points
- 9.3.8 Exercise: Analyze a Factorial Design with Blocks and Center Points

9.4 Fractional Factorial Designs

- 9.4.1 Basic Concepts
- 9.4.2 Creating Fractional Factorial Designs
- 9.4.3 Analyzing Fractional Factorial Designs
- 9.4.4 Quiz: Fractional Factorial Designs
- 9.4.5 Minitab Tools: Create a Fractional Factorial Design
- 9.4.6 Minitab Tools: Analyze a Fractional Factorial Design

9.5 Response Optimization

- 9.5.1 Response Optimization
- 9.5.2 Quiz: Response Optimization
- 9.5.3 Minitab Tools: Response Optimization
- 9.5.4 Exercise: Response Optimization

9.6 Summary

- 9.6.1 Objectives Review



Learn more and find a local Minitab representative at www.minitab.com.