

Statistics Study Guide

Statistics Study Guide

*Introduction to Statistics: Mastering the Fundamentals of
Data Analysis*

Honest Earning

First Edition
Honest Earning Publishing

Statistics Study Guide: Introduction to Statistics: Mastering the Fundamentals of Data Analysis

Copyright © 2026 Honest Earning

All rights reserved.

No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law.

First Edition, 2026

ISBN: 978-93-6038-308-4

Published by Honest Earning Publishing

Table of Contents

INTRODUCTION.....	1
How to Navigate This Textbook.....	9
SECTION 1.....	11
Introduction to Statistics.....	11
Mastering the Fundamentals of Data Analysis.....	11
Introduction.....	11
1. What is Statistics?.....	11
Definition.....	11
Example: Newspaper Preference Study.....	11
2. Descriptive vs. Inferential Statistics.....	12
Descriptive Statistics.....	12
Inferential Statistics.....	12
Key Differences.....	12
3. Levels of Measurement.....	12
Nominal Level.....	12
Ordinal Level.....	13
Interval Level.....	13
Ratio Level.....	13
Key Takeaways.....	13
Practice Questions.....	14
Questions.....	14
Answers.....	14
Chapter 1 Quiz.....	15
SECTION 2.....	17
Descriptive Statistics.....	17
Learning Objectives.....	17
Introduction: The Power of Summarization.....	17
1. Measures of Central Tendency: Finding the Centre.....	17

The Mean (Average).....	17
When to Use Mean.....	18
The Median (Middle Value).....	18
Why Median Matters: The Outlier Scenario.....	18
The Mode (Most Frequent Value).....	18
Comparing the Three Measures.....	19
2. Measures of Dispersion: Understanding Spread.....	19
The Range.....	19
Standard Deviation.....	19
Variance and Standard Deviation.....	19
Interquartile Range (IQR).....	20
Summary: Measures of Dispersion.....	20
3. Frequency Distributions and Contingency Tables.....	20
Example: Coffee Preferences.....	20
Contingency Tables: Two Variables.....	21
Example: Coffee by Gender.....	21
4. Data Visualizations.....	21
Chart Types.....	21
Key Takeaways.....	22
Practice Questions.....	22
Answers.....	22
Chapter 2 Quiz.....	23
Descriptive Statistics.....	23
SECTION 3.....	25
Inferential Statistics.....	25
Practice Questions.....	34
Chapter 3 Quiz.....	36
SECTION 4.....	38
Probability & Distributions.....	38

Practice Questions.....	47
Chapter 4 Quiz.....	48
Section 5.....	50
Correlation & Regression.....	50
Understanding Relationships Between Variables & Building Prediction Models.....	50
Chapter 5 Quiz.....	68
Section 6.....	70
Hypothesis Testing & Comparison Tests.....	70
Mastering T-Tests, ANOVA, and Chi-Square for Comparing Groups.	70
Practice Questions & Solutions.....	84
Chapter 6 Quiz.....	88
Section 7.....	90
Advanced Topics in Statistics.....	90
Effect Size, Power Analysis, Multiple Comparisons, and Non-Parametric Tests.....	90
Practice Questions & Solutions.....	102
Section 7 Quiz.....	106
Section 8.....	108
Advanced Methods & Practical Applications.....	108
Logistic Regression, Clustering, Advanced ANOVA, and Real-World Analysis.....	108
Section 8 Quiz.....	126
Scenario-Based Question.....	127
COMPREHENSIVE STATISTICS EXAM.....	129
Final Assessment - Advanced Level Questions.....	129

INTRODUCTION

Why This Book Was Written

Statistics is often called "the language of data," yet many students and professionals struggle to understand and apply statistical concepts. In our data-driven world, the ability to analyse, interpret, and communicate with data has become an essential skill across virtually every field—from healthcare and business to social sciences and environmental studies.

Despite the critical importance of statistics, most textbooks are either too abstract (filled with heavy mathematics) or too simplistic (lacking practical depth). They present formulas without context, p-values without meaning, and tests without guidance on when to use them. Many students graduate with statistical knowledge they cannot apply to real problems.

This textbook was created to bridge that gap. Our mission is to teach you not just **HOW** to do statistics, but **WHEN** to use which method and **WHY** it matters. We believe statistics should be accessible, practical, and deeply connected to real-world problems you'll actually encounter.

What Makes This Book Different

This comprehensive textbook stands out in several important ways:

1. PRACTICAL FOCUS OVER THEORY

While we explain the underlying logic and mathematics, the emphasis is on application. Each concept is illustrated with real data from actual business scenarios, healthcare studies, and research projects. You'll learn statistics by analysing real problems, not abstract examples.

2. COMPREHENSIVE COVERAGE

From basic descriptive statistics to advanced methods like logistic regression and clustering, this book covers everything you need. Unlike many introductory texts that stop at simple t-tests, we take

you all the way to professional-level methods used by data scientists and researchers.

3. CLEAR EXPLANATIONS WITHOUT JARGON

We explain statistical concepts in plain English. When we use technical terms, we define them clearly. You won't need a statistics dictionary to understand this book. Common misconceptions are explicitly addressed so you understand not just what to do, but what NOT to do.

4. DECISION TREES AND PRACTICAL GUIDANCE

One of the biggest challenges in statistics is knowing which test to use. This book includes comprehensive decision trees and flowcharts that guide you through the choice. Got metric data with three groups? We'll show you exactly what to consider and which test to use.

5. STEP-BY-STEP CALCULATIONS

Every calculation in this book is shown step-by-step. You can follow along with actual numbers and understand exactly how results are computed. This builds real understanding, not just mechanical computation.

6. REAL DATA AND BUSINESS CASE STUDIES

You'll work with 50+ real-world examples from healthcare, e-commerce, manufacturing, and pharma. Three complete case studies show how to combine multiple statistical methods to solve complex real problems. This is how statistics is actually used in practice.

7. COMPREHENSIVE ASSESSMENT

We include 40+ practice problems throughout the text (all with solutions) plus a challenging 10-question final exam with answer keys and scoring rubrics. You'll have ample opportunity to test your understanding.

Who Should Read This Book?

This textbook is designed for multiple audiences:

COLLEGE AND UNIVERSITY STUDENTS

Whether you're taking introductory statistics, applied statistics, or quantitative methods courses, this book provides clear explanations, extensive examples, and practical guidance. It works as a primary textbook or supplementary resource. The decision trees and worked examples are particularly valuable when you're unsure which test to use for your assignments or research projects.

GRADUATE AND DOCTORAL STUDENTS

If you're conducting research for your thesis or dissertation, this book is an invaluable reference. The advanced topics (logistic regression, ANOVA variants, clustering) are covered in depth. The emphasis on assumptions and when to use alternatives prepares you for real research challenges.

PROFESSIONALS TRANSITIONING TO DATA SCIENCE

If you're moving into data science, business analytics, or a quantitative role without formal statistics training, this book fills the gap. The practical focus and real business examples make concepts immediately applicable to your work. You'll learn which statistical methods solve which business problems.

BUSINESS ANALYSTS AND MANAGERS

You need to understand statistical claims, interpret reports, and make data-driven decisions. This book demystifies statistical terminology and helps you ask intelligent questions about data presented to you. Learn what p-values really mean, when confidence intervals matter, and how to spot misleading statistical claims.

HEALTHCARE AND MEDICAL PROFESSIONALS

Whether you're conducting clinical research, interpreting medical literature, or designing treatment protocols, statistics is central to your work. This book covers the specific methods used in healthcare research with examples from medicine, psychology, and public health.