

MATH 117 Introduction to Statistics – Fall 2009 Course Readings and Practice Exercises

The readings and practice exercises for the course are in the text *Fundamentals of Statistics, Second Edition* by Michael Sullivan III. You may purchase this text, published by Pearson Education, Inc., © 2008, packaged with the *MyMathLab Student Access Kit*, from the Framingham State College Bookstore; if you would like to purchase the text packaged with the *MyMathLab Student Access Kit* elsewhere, the ISBN for these materials is ISBN-10: 013235523X or ISBN-13: 9780132355230. While you may choose to purchase the text alone, ISBN-10: 0131569872 or ISBN-13: 9780131569874, you must purchase MyMathLab access in order to complete the online homework assignments; MyMathLab has helpful resources such as additional worked examples, video lectures, additional practice exercises, practice quizzes/tests, and the student solutions manual to accompany the text. If you do not purchase the text with the MyMathLab access code, you may purchase an access code online at <http://www.coursecompass.com/>; left-click the Register button and follow the directions to purchase your access code. Since the text is available online as a part of MyMathLab, you may prefer to use the text online rather than purchasing a paper-copy of the text.

For each of the eight (8) modules, you must read the corresponding sections of the textbook, work on the listed practice exercises, read the PowerPoint slides posted on the course web site and on MyMathLab, watch the video lectures available on MyMathLab, and do the online readings (active hyperlinks provided for your convenience). The purpose of the practice exercises is to allow you to *practice* the techniques and terminology that you are learning throughout the course *before* you take a quiz, turn in a graded assignment, or take an examination. While the practice exercises are not submitted for a grade, many of these practice exercises are used in the online discussions and similar exercises are included in graded assignments on MyMathLab. For online discussions, you must post full explanations and full solutions for selected practice exercises. You earn credit for your posting for discussions of practice exercises only if the full explanation of the solution is provided; you must provide the full statement and associated data for the exercise as part of your discussion posting as well.

Please be careful to keep in mind the examination dates (listed in the syllabus document) and the material to be covered on each examination (listed in this document) as you do the course readings and practice exercises. This is not a self-paced course – all components, including online homework assignments and online discussions, have due dates, and, as stated in the syllabus, late assignments will earn zero (0) points. You must be careful to keep up with the course readings and practice exercises since you need to understand the related topics, concepts, and methods in order to complete the various graded assignments, online discussions, quizzes, and examinations.

As you do the course readings (text, PowerPoint, online), watch the video lectures, and work on the practice exercises, please pay attention to the terminology and the formulas/equations that is used/presented/discussed. You are expected to understand, to be able to use *correctly*, and to be able to define all terminology, and you are expected to understand and to be able to use all formulas/equations discussed/presented in the textbook readings, in the textbook exercises, in the PowerPoint slides, and in other readings. For practice exercises as well as for all discussion postings, all quizzes, all examinations, and all graded assignments, explanations must be given using grammatically correct sentences of more than one word; correct spelling and correct use of terminology is expected and required.

Statistics Glossaries:

- Easton and McColl – [Statistics Glossary](#)
- StatSoft – [Statistics Glossary](#)
- [Statistics Glossary](#) (online text)

▲ Module 1: An Introduction to Statistics

What is Statistics? What are statistics? How are statistics used in various disciplines?

What is Statistics?

- [Statistics on Wikipedia](#)
- [What's the use of statistics, data handling and probability?](#)
- *Some* [History of Statistics](#)

♥ Module 2: Design of Experiments, Sampling, and Data Collection

How does one gather or collect data? What makes a data set representative of the target subjects? Can data be “bad”?

Chapter 1 - Data Collection: Read the complete chapter and access the PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 1.1 Introduction to the Practice of Statistics: Do Concepts and Vocabulary exercises 1 – 14 and Exercises 15 – 57.
- 1.2 Observational Studies; Experiments, and Simple Random Sampling: Do Concepts and Vocabulary exercises 1 – 8 and Exercises 9 – 22..
- 1.3 Other Effective Sampling Methods: Do Concepts and Vocabulary exercises 1 – 8 and Exercises 9 – 34.
- 1.4 Sources of Errors in Sampling: Do Concepts and Vocabulary exercises 1 – 10 and Exercises 11 – 28.
- 1.5 The Design of Experiments: Do Concepts and Vocabulary exercises 1 – 4 and Exercises 5abcde, 6abcde, 7, 8, parts abcde for 9 – 14, 15, 16..
- Chapter Review: Do Review Exercises 1 – 34.

What is Sampling?

- [Sampling Methods](#)
- General Discussion of [Sampling](#)
- [Sampling](#) – Read the Introduction page as well as the pages about various types of sampling; the menu is at the top of the page

Surveys and Questionnaires

- Points to Ponder for [Designing Surveys and Questionnaires](#)

♦ Module 3: Summarizing Data Graphically

How can we present data in a manner so that it can be easily understood? What types of representations can be used or cannot be used with different types of data? Can a graphical representation for data be misleading?

Chapter 2 - Organizing and Summarizing Data: Read the complete chapter and access the PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 2.1 Organizing Qualitative Data: Do Concepts and Vocabulary exercises 1 – 8 and Exercises 9 – 32.
- 2.2 Organizing Quantitative Data: Do Concepts and Vocabulary exercises 1 – 5 and Exercises 7 – 50.
- 2.3 Graphical Misrepresentations of Data: Do Exercises 1 – 9, 12.
- Chapter Review: Do Review Exercises 1 – 20.

What graphs are appropriate for different variables?

- [Graphing Qualitative Variables](#)
- [Graphing Quantitative Variables](#)

♣ Module 4: Summarizing Data Numerically

How can we represent data numerically using as few numbers as possible to convey the information associated with the data? How can data be summarized numerically? When is it impossible to summarize data numerically?

Chapter 3 - Numerically Summarizing Data: Read the complete chapter and access the PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 3.1 Measures of Central Tendency: Do Concepts and Vocabulary exercises 1 – 10 and Exercises 11 – 42, 49 – 52.
- 3.2 Measures of Dispersion: Do Concepts and Vocabulary exercises 1 – 10 and Exercises 11 – 44, 47.
- 3.3 Measures of Central Tendency and Dispersion from Grouped Data: Do Concepts and Vocabulary 1 and 2 and Exercises 3 – 12, 15 – 20.
- 3.4 Measures of Position: Do Concepts and Vocabulary 1 – 6 and Exercises 7 – 14, 15bcd – 18bcd, 19 – 22.
- 3.5 The Five-Number Summary and Boxplots: Do Concepts and Vocabulary 1 and 2 and Exercises 3 – 17.
- Chapter Review: Do Review Exercises 1 – 20.

How do we summarize a data set?

- [Summarizing Distributions](#) select “Summarizing Distributions” in the Table of Contents
- [Measures of Central Tendency](#)
- [Comparing Measures of Central Tendency](#)
- [Measures of Variability](#)

Examination I (Modules 1, 2, 3, and 4; Chapters 1, 2, and 3) *

◆ Module 5: Probability

What is probability? How does probability affect what we expect to have happen? What does it mean for a die or a game to be “fair”? How can probability be used to determine one’s expected winnings for a game of chance, a raffle, or the lottery?

Chapter 5 - Probability: Read the complete chapter and access the PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 5.1 Probability Rules: Do Concepts and Vocabulary exercises 1 – 8 and Exercises 9 – 48, 51, 53, 54.
- 5.2 The Addition Rule and Complements: Do Concepts and Vocabulary exercises 1 – 4 and Exercises 5 – 42.
- 5.3 Independence and the Multiplication Rule: Do Concepts and Vocabulary exercises 1 – 6 and Exercises 7 – 27.
- 5.4 Conditional Probability and the General Multiplication Rule: Do Concepts and Vocabulary exercises 1 – 2 and Exercises 3 – 34.
- 5.5 Counting Techniques: Do Concepts and Vocabulary exercises 1 – 2 and Exercises 5 – 70.
- Chapter Review: Do Review Exercises 1 – 35.

Chapter 6 - Discrete Probability Distributions: Read the complete chapter and access the PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 6.1 Discrete Random Variables: Do Concepts and Vocabulary exercises 1 – 5 and Exercises 7 – 36.
- 6.2 The Binomial Probability Distribution: Do Concepts and Vocabulary exercises 1 – 6 and Exercises 7 – 49, 52, 53.
- Chapter Review: Do Review Exercises 1 – 16.

How do we calculate probability?

- [Basic Probability](#)
- [Foundations of Probability Theory: Basic Definitions](#)
- [Probability](#) – Select “Probability” in the Table of Contents
- [An Introduction to Probability](#)
- [Animated Quiz](#)
- [What is a probability distribution function?](#)
- [Discrete Random Variables: Probability Distribution Function \(PDF\) for a Discrete Random Variable](#)

♥ Module 6: The Normal Distribution

What is the Normal Distribution? How do we determine if a distribution is normal? What are the characteristics of the standard normal distribution? How is the standard normal distribution related to any normal distribution? How do we use the standard normal distribution to determine information about any normal distribution even if we do not have the data set available?

Chapter 7 - The Normal Probability Distribution: Read the complete chapter and access the PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 7.1 Properties of the Normal Distribution: Do Concepts and Vocabulary exercises 1 – 6 and Exercises 7 – 12, 19 – 36.
- 7.2 The Standard Normal Distribution: Do Concepts and Vocabulary exercises 1 – 4 and Exercises 5 – 50.
- 7.3 Applications of the Normal Distribution: Do Concepts and Vocabulary exercises 1 – 2 and Exercises 3 – 34.
- 7.4 Assessing Normality: Do Concepts and Vocabulary exercises 1 – 4 and Exercises 5 – 30.
- 7.5 The Normal Approximation to the Binomial Probability Distribution: Do Concepts and Vocabulary exercises 1 - 3 and Exercises 1 - 26.
- Chapter Review: Do Review Exercises 1 – 32, 38.

How do we use the normal distribution?

- [What is normal distribution?](#)
- [Standard Normal Distribution](#)
- [Normal Distribution](#) – Select “Normal Distributions” in the Table of Contents
- [What’s so important about the normal distribution?](#)
- [Normal Distribution](#) (chapter of online text)
- [Normal Distribution](#) (technical)
- [Normal Distribution](#) (also technical but some good graphs)

* The chapters/topics for Examination I may be adjusted if necessary.

Examination II (Modules 5 and 6; Chapters 5, 6, and 7)♦

✦ Module 7: Confidence Intervals and Hypothesis Testing

What is a confidence interval? What information can be determined using a confidence interval? How does one formulate a hypothesis? How does one determine if a hypothesis is valid?

Chapter 8 – Sampling Distributions Read the complete section and access the corresponding PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 8.1 Distribution of the Sample Mean: Do Concepts and Vocabulary exercises 1 – 10 and Exercises 11 – 30.
- 8.2 Distributions of the Sample Proportion: Do Concepts and Vocabulary exercises 1 – 6 and Exercises 7 – 22.
- Chapter Review: Do Review Exercises 1 – 14.

More about sampling distributions

- [Sampling Distributions](#) – Select “Sampling Distributions” in the Table of Contents
- [Sampling Distributions](#) (chapter of online text)
- [Introduction to Sampling Distributions](#)
- [Sampling Distribution of the Mean](#)
- [Central Limit theorem](#)
- [Central Limit Theorem](#) - Applet

Chapter 9 – Estimating the Value of a Parameter Using Confidence Intervals: Read the complete section and access the corresponding PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 9.1 The Logic in Constructing Confidence Intervals about a Population Mean where the Population Standard deviation is Known: Do Concepts and Vocabulary exercises 1 – 6 and Exercises 7 – 32, 35 – 44.
- 9.2 Confidence Intervals about a Population Mean in Practice where the population standard Deviation is Unknown: Do Concepts and Vocabulary exercises 1 – 6 and Exercises 7 – 28.
- 9.3 Confidence Intervals about a Population Proportion: Do Concepts and Vocabulary exercises 1 – 4 and Exercises 5 – 17.
- 9.4 Putting It All Together: Which Method Do I Use?: Do Concepts and Vocabulary exercises 1 – 2 and Exercises 3 – 18.
- Chapter Review: Do Review Exercises 1 – 14.

What are confidence intervals?

- [Confidence Intervals](#) (online glossary)
- [Confidence Intervals](#) (includes applet)
- [Confidence Intervals](#) – Select “Estimation” and then “Confidence Intervals” on the Table of Contents
- [Confidence Interval for a Population Proportion](#)
- [Confidence Intervals: Confident Interval, Single Population Mean, Standard Deviation Known, Normal](#)
- [Confidence Intervals: Confidence Interval, Single Population Mean, Standard Deviation Unknown, Student-t](#)

Chapter 10 - Hypothesis Testing Regarding a Parameter: Read the both sections and access the corresponding PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 10.1 The Language of Hypothesis Testing: Do Concepts and Vocabulary exercises 1 – 8 and Exercises 9 – 22, 35 – 40.
- 10.2 Hypothesis Tests for a Population mean Assuming the Population Standard Deviation is Known: Do Concepts and Vocabulary exercises 1 – 10 and Exercises 11 – 32.
- 10.3 Hypothesis Tests for a Population Mean in Practice: Do Concepts and Vocabulary exercises 1 – 4 and Exercises 5 – 23.
- 10.4 Hypothesis Tests for a Population Proportion: Do Concepts and Vocabulary exercises 1 – 2 and Exercises 3 – 20.
- 10.5 Putting it all together: Which Method Do I Use?: Do Concepts and Vocabulary exercises 1 – 2 and Exercises 3 – 18.

♦ The chapters/topics for Examination II may be adjusted if necessary.

- Chapter Review: Do Review Exercises 1 – 18.

What is hypothesis testing?

- [Hypothesis Testing](#)
- [Hypothesis Testing](#) (technical)
- [Hypothesis Testing](#)
- [Hypothesis Testing](#) – Select “Logic of Hypothesis Testing” in the Table of Contents

Examination III (Module 7; Chapters 8, 9, and 10)♥

♣ Module 8: Analyzing and Representing the Relationship Between Two Variables

How do we determine if there is a relationship between two variables? What types of relationships can there be between two variables? How can we discuss a relationship between two variables? How can we represent the relationship between two variables? How do we determine the strength of the relationship between two variables?

Chapter 4 - Describing the Relationship Between Two Variables: Read the complete chapter and access the PowerPoint slides. Visit [MyMathLab](#) for additional PowerPoint slides, practice quiz/examination problems, video lectures, and additional resources.

- 4.1 Scatter Diagrams; Correlation: Do Concepts and Vocabulary exercises 1 – 7, 9 and Exercises 11 – 32, 35 – 38, 41, 45.
- 4.2 Least-Squares Regression: Do Concepts and Vocabulary exercises 1 – 8 and Exercises 9 – 24.
- Chapter Review: Do Review Exercises 1 – 10, 15 – 17..

How do we analyze bivariate data?

- An Introduction to [Bivariate Data](#) – Select “Describing Bivariate Data” in the Table of Contents
- [Values of Pearson Correlation](#)
- [Guessing Correlations A](#)
- [Guessing Correlations B](#)
- [Correlation Coefficient](#) (more technical)
- [Computing Correlation Coefficient](#) (has hyperlink to an example)

Technology for Chapter 4: You may find these handouts helpful to you

MS Excel:

- [A Short Tour of MS Excel](#)
- [Using MS Excel: Basics](#)

TI-83/TI-83+/TI-84/TI-84+ (all of these operate in the same manner and use the same keys):

- [Using the TI-83: Scatterplot and Regression](#)

Final Examination (Modules 1 – 8; Chapters 1 – 10)♣

♥ The chapters/topics for Examination III may be adjusted if necessary.

♣ The Final Examination will test your knowledge of all the chapters/topics covered in this course.