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APPENDIX

Overview

Course Description

Quantitative Analysis limits its focus to the practical application of quantitative tools for analyzing data, drawing appropriate conclusions from datasets, and presenting both the analysis and conclusions in ways that enhance communication with appraisal clients. It reviews and furthers the application of some of the basic statistical measures (mean, median, mode, standard deviation, etc.) and spends a good deal of time on linear regression analysis for use in producing and understanding various types of analyses. Central goals of the course are showing participants how to understand the reliability and validity of all data used to draw conclusions and providing the knowledge needed to check the validity of the conclusions others may draw from the same or similar datasets. Each presentation and activity demonstrates real-world appraisal applications and is aimed at furthering an appraiser's ability to provide credible analysis of issues related to real property. The goals for the course are to help participants

- Properly apply and explain statistical methods, such as simple and multiple linear regression analysis, using market information
- Understand and critique statistical applications
- Understand how to incorporate statistical analysis in valuation reports
- Understand how to evaluate the reliability of various types of data used in valuation
- Build competence in using the language of quantitative analysis
- Use graphs to present data and analysis
- Understand research design issues such as hypothesis construction, data reliability and validity, and sampling

This course is one of a series of courses that are part of the Appraisal Institute Analytics for Valuation and Real Estate Analyst Professional Development Programs. For more information about the programs, see Professional Development Programs on the Appraisal Institute website at www.appraisalinstitute.org.

Important Notes

- ***Diagnostic Test Prerequisite.*** To successfully complete courses in the advanced education curriculum, it is important that participants have basic spreadsheet skills. Therefore, before enrolling in an advanced education course, participants are required to take a diagnostic test in which the participant demonstrates his or her skill level in creating and working with spreadsheets. Participants may register

for an advanced education course if they do not pass the diagnostic test, but it is not recommended.

- ***Blended Learning.*** Each course in the advanced curriculum incorporates both online and live classroom learning. A two-hour online session begins the course. While the content for each course is different, these online sessions all incorporate discussion and examples, and require participants to complete various tasks. By completing the online session, participants will have a better understanding of what to expect in the live classroom sessions that will follow. If the tasks are difficult, participants will have time to review and prepare before the live portion of the course begins. Tasks will not be graded; however, they must be completed to successfully pass the course. The online session, which goes live 28 days before the classroom session begins, must be completed ***BEFORE*** the classroom session begins.

- ***Excel Datasets.*** This course incorporates a variety of interactive learning activities, including Excel datasets. Participants are required to download the necessary Excel files while completing the online session so that they have them when they begin the classroom portion of the course.

- The Excel datasets for *Quantitative Analysis* may be used during the course as an aid in problem solving but also have real-world applications outside the course. Many have embedded calculations; these are for simplicity but should not be used as a crutch. It is essential that participants understand the logical and mechanical operations associated with the Excel files and not just obtain the right answer.

Learning Enhancements

The course has been designed with a variety of elements to enhance your learning experience.

- ***Preview.*** To give you a taste of what is to come, each part begins with a preview page that includes a brief overview of the content, learning objectives to consider as you move through the content, and learning tips that will assist you in understanding the information you're about to cover.

- ***Learning Objectives.*** Each learning objective covers essential information for understanding the concepts in the course. Look them over before the part begins so that you have a frame of reference as you move through the material. At the end of each part, reread the objectives. Are you able to do what is stated? If not, this is the time to ask your instructor for help or review the concepts that you do not understand.

- ***Examples and Problems.*** To supplement the discussions, we've included examples and exercises to help you visualize and practice what you are learning.

- ***Review.*** Each part concludes with a review, which includes the learning objectives and key terms and concepts that have been covered. Also, we've provided recommended readings and additional practice problems from the course textbook, *An Introduction to Statistics for Appraisers*, which will reinforce what you have learned in class.

- ***Practice Tests.*** Practice tests are included throughout the course. The questions are similar to the types of questions you might find on the exam. By answering these questions, you will find out whether you can apply the concepts covered.

Class Policies

- 100% attendance is required. No exceptions.

- Limit use of computers and wireless devices to classroom projects.

- Communicate with business associates during break time instead of class time.

- During class, do not read materials that are not used in class, such as news, email, and social media.

- Silence cell phones and other communication devices.

- Use recording devices only if prior permission has been granted.

- If attending a classroom offering, refrain from ongoing conversations with those seated near you and other distracting behavior.

General Information

- **Calculators.** A financial calculator is required. The accepted model used in the course is the HP-12C.

- **Laptop computers.** A laptop computer is required.

- **Spreadsheet program. Excel 2010** is required.

- **Breaks.** There will be two 10-minute breaks during the morning session and two 10-minute breaks during the afternoon session unless noted otherwise by the course sponsor. The lunch break is one hour.

- **Attendance sheets** will be distributed during class to verify your attendance during the morning and afternoon sessions.

- **Certificates of completion** may be downloaded after completion of the course, and attendance during the entire course is required.

Required Text

- Wolverton, Marvin L., Ph.D., MAI. *An Introduction to Statistics for Appraisers.* Chicago: Appraisal Institute, 2009. (See errata list on the following page.)

Recommended Text

- *The Dictionary of Real Estate Appraisal*, 7th ed., Chicago: Appraisal Institute, 2015.

Prerequisites

Required

- *Advanced Education Diagnostic Test:* Participants are required to take a diagnostic test in which the participant demonstrates his or her skill level in creating and working with spreadsheets. Participants may register for an advanced education course if they do not pass the diagnostic test, but it is not recommended.

Recommended

- *Real Estate Finance, Statistics, and Valuation Modeling*

- *Using Spreadsheet Programs in Real Estate Appraisals—The Basics* or similar course/seminar

Exam

- 40 multiple-choice questions

- **Calculators.** A financial calculator is required for the exam. The accepted model used in the course is the HP-12C.

- **Important note.** All laptops, cellular phones, tablets, iPads, wearable technology (smart watch, Apple Watch, Google Glass, etc.), and other devices that can store data or connect to the internet are ***NOT*** permitted during the exam. In addition, all watches, wallets, bags, and purses must be removed and stored out of reach prior to taking the exam.

Errata: *An introduction to Statistics for Appraisers*

Page 80. The second sentence in the first paragraph in the **Variance and Standard Deviation** section states

> The population standard deviation is the mean of the deviations of all elements of the population.
>
> **CORRECTION:**
>
> The population variance is the mean of the squared deviations of all elements of the population.

Page 162. The second string of equations has a misplaced decimal point in the denominator. It says "0.44^2" and it should say "0.044^2." The corrected string of equations is

$$n = \frac{Z^2 p(p-1)}{e^2} = \frac{1.96^2 \bullet 0.50(1-0.50)}{0.044^2} = 496$$

Page 179. The first line of the first sentence in the **Using the *t* Statistic to Test Hypotheses about the Mean** section includes a typographical error. The word "vancy" should be "vacancy."

Page 271. The equations for mean square prediction error and mean absolute prediction error are written incorrectly. They should be written as follows:

$$\text{Mean Square Prediction Error} = \frac{\sum_{i=1}^{n'} (y_i - \hat{y}_i)^2}{n'}$$

$$\text{Mean Absolute Prediction Error} = \frac{\sum_{i=1}^{n'} \left| y_i - \hat{y}_i \right|}{n'}$$

Page 296. The first string of equations on this page is missing a 1. It should read as follows:

$$R^2 = 1 - \frac{SSE}{SST} = 1 - \frac{3.81\text{E}10}{2.33\text{E}11} = 1 - \frac{3.81}{23.3} = 1 - 0.164 = 0.836$$

Page 349. The answer to Question 10 in Problems 2.1 is written as "-xyzt." The correct answer is "$-yzt^2$."

Page 370: The term "covariance" should be "coefficient of variation." Formula is correct.