

EXAM CODE **210**

CATALOG NUMBER **MATx210**

TAKE ADVANTAGE OF ONLINE
PRACTICE EXAMS
SEE PAGE 5 FOR DETAILS

Statistics

CREDIT HOURS

3

LEVEL

LOWER

PUBLISHED FEBRUARY 2021

The most current content guides are available at:

www.excelsior.edu/contentguides

U **EXCEL**[®]
STUDY.LEARN.SUCCEED.

CONTENTS

Preparing for the Exam	1
Before You Choose This UExcel Exam	1
Uses for the Examination.....	1
Examination Length and Scoring.....	1
Score Reporting.....	2
Letter Grade Description.....	2
Excelsior College Bookstore.....	2
Excelsior College Library.....	2
Take Charge of Your Own Learning	2
How Long Will It Take Me to Study?.....	2
How Can I Create an Effective Long-Term Study Plan?.....	3
What Learning Strategy Should I Use?.....	4
Study Tips.....	4
Using UExcel Practice Exams.....	5
About Test Preparation Services.....	6
Exam Preparation Strategies	6
Content Guides.....	6
Using the Content Outline.....	6
Using the Sample Questions and Rationales.....	6
Recommended Resources for the UExcel Exam in Statistics	7
Textbook Editions.....	7
Strongly Recommended.....	7
Optional Resources.....	7
Reducing Textbook Costs.....	7
Open Educational Resources.....	7
Content Outline	9
General Description of the Examination.....	9
Learning Outcomes.....	9
General Education Career Competencies Addressed in this Exam.....	9
Content Outline.....	10
Sample Questions	14
Rationales	18
Formula Information	22
Formulas.....	22
Tables.....	22
Taking the Exam	23
Registering for Your Exam	23
Register Online.....	23
Examination Administration.....	23
Accessibility Services.....	23
Computer-Delivered Testing.....	23
Breaks.....	23
Online Proctoring.....	23
On the Day of Your Exam	24
Important Reminders.....	24
Academic Integrity Nondisclosure Statement.....	24
UExcel Grade Report.....	24
Grade Appeals.....	24
What If I Miss My Appointment?.....	24
Late Arrivals.....	24
Information About UExcel Exams for Colleges and Universities.....	24
Statistics Exam Development Committee	25
Sample Grade Report	26



SECTION ONE

Preparing for the Exam

Before You Choose This UExcel Exam

Uses for the Examination

- Excelsior College, the test developer, recommends granting three (3) semester hours of lower-level undergraduate credit to students who receive a letter grade of C or higher on this examination.
- Other colleges and universities also recognize this exam as a basis for granting credit or advanced standing.
- Individual institutions set their own policies for the amount of credit awarded and the minimum acceptable score.

Examinees who have applied to Excelsior College should ask their academic advisor where this exam fits within their degree program.

Examinees **not enrolled** in an Excelsior College degree program should check with the institution from which they wish to receive credit to determine whether credit will be granted and/or to find out the minimum grade required for credit. Those who intend to enroll at Excelsior College should ask an admissions counselor where this exam fits within their intended degree program.

For more information on exam availability and actual testing information, see the [Exam Registration and Information Guide](#).

Examination Length and Scoring

This examination consists of 72 multiple choice and other type questions. You will have two (2) hours to complete the exam. Your score will be reported as a letter grade. Questions are scored either correct (1) or incorrect (0). There is no partial credit. Each credit-bearing exam contains pretest questions, which are embedded throughout the exam. They are indistinguishable from the scored questions. It is to your advantage to do your best on all the questions. Pretest questions are being tried out for use in future versions of the exam.

The UExcel exams do **not** have a fixed grading scale such as A = 90–100%, B = 80–90%, and so forth, as you might have seen on some exams in college courses. Each UExcel test has a scale that is set by a faculty committee and is different for each exam. The process, called standard setting, is described in more detail in the [Technical Handbook](#). Excelsior puts each exam through a standard setting because different test questions have different levels of difficulty. To explain further, getting 70% of the questions right on the exam when the questions are easy does not show the same level of proficiency as getting 70% of questions correct when the questions are hard. Every form of a test (a form contains the test questions) has its own specific grading scale tailored to the particular questions on each exam form.

Please also note that on each form, some of the questions (referred to as pretest questions) count toward the score and some do not; the grading scale applies only to those questions that count toward the score. The area with percentage ratings on the second page of your score report is intended to help identify relative strengths and weaknesses and which content areas to emphasize, should you decide to take the examination again. Your grade

is **based on only the scored questions**. Therefore, the percentage ratings do not necessarily reflect the total percentage that counted toward your grade.

For the best view of the types of questions on this exam, see the sample questions in the back of this guide. Practice, practice, practice!

Score Reporting

For most of our examinations, based on performance, an examinee is awarded a letter grade of A, B, C, or F. A letter grade of D can be given, but credit is awarded for A, B, and C letter grades only. The letter grades reported to examinees indicate that their performance was equivalent to the performance of students who received the same letter grade in a comparable, on-campus course.

More specifically, the letter grade indicates the examinee's proficiency relative to the learning outcomes specified in the exam content guide. Following are general descriptions of examinee performance at each level:

Letter Grade Description

- A Highly Competent: Examinee's performance demonstrates an advanced level of knowledge and skill relative to the learning outcomes.
- B Competent: Examinee's performance demonstrates a good level of knowledge and skill relative to the learning outcomes.
- C Marginally Competent: Examinee's performance demonstrates a satisfactory level of knowledge and skill relative to the learning outcomes.
- D Not Competent (no credit recommended): Examinee's performance demonstrates weak knowledge of the content and minimal skill relative to the learning outcomes.^①
- F Fail (no credit recommended): Examinee's performance demonstrates no knowledge of the content and no skill in the subject relative to the learning outcomes.

Credit is transcribed by Excelsior College for examinees who achieve letter grades of C or higher.

We encourage colleges and universities to use the Excelsior College letter grades of A, B, and C as acceptable standards for awarding credit.

^① In general, two-hour exams do not award a D letter grade.

See page 26, at the back of this content guide, for a sample UExcel Grade Report for Examinations.

Excelsior College Bookstore

The Excelsior College Bookstore offers recommended textbooks and other resources to help you prepare for UExcel exams.

The bookstore is available online at (login required): www.excelsior.edu/bookstore

Excelsior College Library

Library services are available to students enrolled in a degree program at Excelsior College. Created through our partnership with the Sheridan Libraries of The Johns Hopkins University, the library provides access to journal articles, books, websites, databases, reference services, and many other resources. To access the Excelsior College Library, visit www.excelsior.edu/library (login is required). Access to the library is available 24/7.

Take Charge of Your Own Learning

At Excelsior College, independent, self-directed study supported by resources we help you find is not a new concept. We have always stressed to students who take exams that they are acting as their own teacher, and that they should spend as much time studying for an exam as they would spend in a classroom and on homework for a corresponding college course in the same subject area.

Begin by studying the content outline contained in this content guide, at its most detailed level. You will see exactly which topics are covered, and where chapters on those topics can be found in the Recommended Resources. You will see exactly where you might need to augment your knowledge or change your approach.

The content outline, along with the learning outcomes for this exam and recommended textbooks, will serve as your primary resources.

How Long Will It Take Me to Study?

Study for a UExcel exam is comparable to an equivalent college-level course. As an independent

learner, you should study and review as much as you would for the same subject in a campus-based college course. If you already have a background in the subject, you may be able to pass the exam successfully with fewer hours of study. It depends upon the learner as well as the subject, the number of credits (for example, a 6- or 8-credit exam will require more hours of study than a 3-credit exam), and the length of the exam. We strongly encourage you to create a long-term action or study plan, so that you have a systematic approach to prepare for the exam. We've included guidelines for creating such a plan.

How Can I Create an Effective Long-Term Study Plan?

1. Determine the time you will require to complete your preparation for this exam. If you have not studied the subject before, you should plan to budget approximately 45 hours of study time for every credit: 135 hours for 3 credits, 180 hours for 4 credits, 270 hours for 6 credits, and 360 hours for 8 credits. These hours are rules of thumb based on expectations for a student taking a course in the subject; it may take you more or less time, depending on how familiar you are with the material and how easily you absorb the information studying on your own. Aside from the content review, you should then factor in time to search for and use other resources, and to complete any projects and assignments in the study materials that will clarify your understanding of the topics in the content outline (that part in the content guide where the specific areas of study are spelled out). Spend more time on concepts and areas in which you feel you are weak. Totaled, this is approximately the amount of time you should expect to devote to a three-credit, campus-based course. The actual amount of time you require depends on many factors, and will be approximate. If your background is weak, you may need to set aside substantially more than 135–150 hours. If your background is strong, you may budget less time.

Take a few minutes to review the content outline to assess your familiarity with the content. Then, in the space below, write the number of hours you will allocate to complete preparing for the exam.

Hours Required =

2. Determine the time you will have available for study.

In self-study, you need structure, as well as motivation and persistence, and a methodical approach to preparation. There is no set class to keep you on task. You have to do that yourself. Construct a time-use chart to record your daily activities over a one-week period. The most accurate way to do this is to complete the chart on a daily basis to record the actual amount of time you spend eating, sleeping, commuting, working, watching television, caring for others and yourself, reading, and everything else in an adult's life. However, if your schedule is regular, you might prefer to complete the chart in one sitting and, perhaps, by consulting your appointment book or planner.

After you have recorded your activities, you will be ready to schedule study periods around these activities or, perhaps, instead of some of them. In the space below, write the number of hours you will be able to set aside for study each week.

Hours Required =

3. Divide the first number by the second number.

This will give you the number of weeks you will need to set aside for independent study. For example, if you think you will require 170 hours of study and you have 10 hours available to study each week, divide 170 hours by 10 hours and you will get 17. This means that you will need about 17 weeks to complete this course of study. However, you will also need to allow about a week for review and self-testing. Moreover, to be on the safe side, you should also add two weeks to allow for unforeseen obstacles and times when you know you will not be able to study (e.g., during family illnesses or holidays). So, in this case, you should allot a total of 18 to 19 weeks to complete your study.

4. Schedule your examination to coincide with the end of your study period.

For example, if you plan to allow 18 weeks for study, identify a suitable examination date and begin study at least 18 weeks before that date. (The date you begin study assumes that you will have received all of your study materials, particularly textbooks, by that time.)

5. Format a long-term study plan.

You will need to use a calendar, planner, or some other tool to format and track your long-term study plan. Choose a method that is convenient and one that keeps you aware of your study habits on a daily basis. Identify the days and exact hours of each day that you will reserve for study throughout your whole independent study period. Check to see that the total number of hours you designate for study on your long-term study plan adds up to the number of hours you have determined you will need to complete this course of study (Step 1).

6. Record in your long-term study plan the content you plan to cover during each study period.

Enter the session numbers, review, and examination preparation activities you will complete during each study period. While it is suggested that approximately 160–170 hours of study is required for this exam, each and every student may require different timelines based on their comfort with, and comprehension of, the material.

You now have a tentative personal long-term study plan. Keep in mind that you will have to adjust your study plan, perhaps several times, as you study. It is only by actually beginning to work systematically through the material, using the content outline, that you will be able to determine accurately how long you should allow for each unit.

What Learning Strategy Should I Use?

The following guidelines are intended to help you acquire the grounding in the knowledge and skills required for successful completion of this examination.

1. Approach learning with a positive attitude.

Most students are capable of learning subject content if they devote enough time and effort to the task. This devotion will give you a positive edge and a feeling of control.

2. Diligently complete the exact work you specified in your study plan.

Your study plan is being designed for the specific purpose of helping you achieve the learning outcomes for this exam.

3. Be an active learner.

You should actively engage in the learning process. Read critically, take notes, and continuously monitor your comprehension. Keep a written record of your progress, highlight content you find difficult to grasp, and seek assistance from someone in your learning community who can help you if you have difficulty understanding a concept.

4. Be patient: you may not understand everything immediately.

When encountering difficulty with new material, be patient with yourself and don't give up. Understanding will come with time and further study. Sometimes you may need to take a break and come back to difficult material. This is especially true for any primary source material (original letters, documents, and so forth) that you may be asked to read. The content outline will guide you through the material and help you focus on key points. You will find that many concepts introduced in earlier sessions will be explained in more detail in later sessions.

5. Apply your learning to your daily life.

Use insights you gain from your study to better understand the world in which you live. Apply the learning whenever you can. Look for instances that support or contradict your reading on the subject.

6. Accommodate your preferred way of learning.

How do you learn best? Common ways to learn are reading, taking notes and making diagrams, and by listening to someone (on video or live). Others learn by doing. Do any of these descriptions apply to you? Or does your learning style vary with the learning situation? Decide what works for you and try to create a learning environment to accommodate your preferences.

Study Tips

Become an active user of the resource materials. Aim for understanding rather than memorization. The more active you are when you study, the more likely you will be to retain, understand, and apply the information.

The following techniques are generally considered to be active learning:

- **preview or survey** each chapter

- **highlight or underline text** you believe is important
- **write questions or comments** in the margins
- **practice re-stating content** in your own words
- **relate what you are reading** to the chapter title, section headings, and other organizing elements of the textbook
- **find ways to engage** your eyes, your ears, and your muscles, as well as your brain, in your studies
- **study with a partner or a small group**
- **prepare your review notes** as flashcards or create recordings that you can use while commuting or exercising

When you feel confident that you understand a content area, review what you have learned. Take a second look at the material to evaluate your understanding. If you have a study partner, the two of you can review by explaining the content to each other or writing test questions for each other to answer. Review questions from textbook chapters may be helpful for partner or individual study, as well.

Study smart for your UExcel exam! Success starts with establishing a relationship with your advisor.

Using UExcel Practice Exams

The official UExcel practice exams are highly recommended as part of your study plan. They can be taken using any computer with a supported web browser such as Google Chrome.

The practice exam package comes with two sets of questions. Please be aware that there will be fewer questions on the practice exams than there will be on the exam you take for credit. Generally, the practice questions will not be the same as the ones you will see when you take the actual exam for credit. They are intended to expose you to the types of questions you'll encounter in the actual exam. Practice questions are a tool, and do not provide a full exam experience. For example, the practice question sets do not have time limitations. Begin with the Content Guide, especially the detailed content outline. Memorizing specific questions and answers on the practice sets is not as effective as using the questions to practice, along with the content outline, to see which concepts you may need to study further. To register for the practice exam, visit www.excelsior.edu and log into your MyExcelsior

account. **Please note: You must be registered for the corresponding credit-bearing exam before you can register for the practice exam.**

Practice exams are not graded. Rather, they are intended to help you make sure you understand the subject and give you a sense of what the questions will be like on the exam for credit. Ideally, you would check any questions you got wrong, look at the explanations, and go back to the textbook to reinforce your understanding. After taking both forms of the practice exam, you should feel confident in your answers and confident that you know the material listed in the content outline.

Practice exams are one of the most popular study resources. Practice exams are typically shorter than the credit-bearing exam. Since the questions are drawn from the same pool of questions that appear on the credit-bearing exam, what you will see when you sit for the graded exam will be roughly the same. Used as intended, these practice exams will enable you to:

- Review the types of questions you may encounter on the actual exam.
- Practice testing on a computer in a timed environment.
- Practice whenever and wherever it is convenient for you.

Take two different forms of a practice exam within a 180-day period. (We highly recommend that you take the first form of the practice exam as a pretest, early in the study period. Use the results to identify areas to further study and carry out a plan. Then take the second form as a post-test and see how much you have improved.)

Although there is no guarantee, our research suggests that exam takers who do well on the practice exams are more likely to pass the actual exam than those who do not take advantage of the opportunity. Note that since the practice exams are not graded (calibrated) the same way as the scores on the credit-bearing exam, it will be hard for you to use the practice exams as a way to predict your score on the credit-bearing exam. The main purpose of the practice exams is for you to check your knowledge and to become comfortable with the types of questions you are likely to see in the actual, credit-bearing exam.

About Test Preparation Services

Preparation for UExcel® exams and Excelsior College® Examinations, though based on independent study, is supported by Excelsior College with a comprehensive set of exam learning resources and services designed to help you succeed. These learning resources are prepared by Excelsior College so you can be assured that they are current and cover the content you are expected to master for the exams. These resources, and your desire to learn, are usually all that you will need to succeed.

There are test-preparation companies that will offer to help you study for our examinations. Some may imply a relationship with Excelsior College and/or make claims that their products and services are all that you need to prepare for our examinations.

Excelsior College does not endorse the products and services of any tutorial or test preparation firm. We do not review the materials provided by these firms for the content or compatibility of their material and resources with UExcel® exams or Excelsior College Examinations®. No test preparation vendor is authorized to provide admissions counseling or academic advising services, or to collect any payments, on behalf of Excelsior College. Excelsior College does not send authorized representatives to a student's home nor does it review the materials provided by test preparation companies for content or compatibility with Excelsior College examinations.

To help you become a well-informed consumer, we suggest that before you make any purchase decision regarding study materials provided by organizations other than Excelsior College, you consider the points outlined on our website at www.excelsior.edu/testprep.

Exam Preparation Strategies

Each learner is different. However, all learners should read the content outline in the exam's Content Guide and ensure that they have mastered the concepts. For someone with no prior knowledge of the subject, a rule of thumb is 135 hours of study for a 3-credit exam—this number is just to give you an idea of the level of effort you will need, more or less.

Content Guides

This content guide is the most important resource. It lists the outcomes, a detailed content outline of what is covered, and textbooks and other study resources. It also has sample questions and suggestions for how to study. Content guides are updated periodically to correspond with changes in particular examinations and in textbook editions. Examinees can download any of the latest free UExcel content guides by visiting the individual exam page or from the list at www.excelsior.edu/contentguides.

Using the Content Outline

Each content area in the content outline includes the most important sections of the recommended resources for that area. These annotations are not intended to be comprehensive. You may need to refer to other chapters in the recommended textbooks. **Chapter numbers and titles may differ among textbook editions.**

This content outline contains examples of the types of information you should study. Although these examples are many, do not assume that everything on the exam will come from these examples. Conversely, do not expect that every detail you study will appear on the exam. Any exam is only a broad sample of all the questions that could be asked about the subject matter.

Using the Sample Questions and Rationales

Each content guide provides sample questions to illustrate those typically found on the exam. These questions are intended to give you an idea of the level of knowledge expected and the way questions are typically phrased. The sample questions do not sample the entire content of the exam and are not intended to serve as an entire practice test.

Recommended Resources for the UExcel Exam in Statistics

The resources listed below were selected by the faculty members on the examination committee for use in developing this exam.

Resources listed under “Strongly Recommended” were used by the committee to verify all the questions on the exam. Please refer to the Content Outline to see which parts of the exam are cross-referenced to these resources.

Resources listed under “Optional” provide additional material that may deepen or broaden your understanding of the subject, or that may provide an additional perspective on the exam content. Textbook resources, both Strongly Recommended and Optional, may be purchased from the [Excelsior College Bookstore](#).

You should allow ample time to obtain the necessary resources and to study sufficiently before taking the exam, so plan appropriately, with an eye towards your own personal learning needs. See the sections in this guide on the Excelsior College Bookstore and the Excelsior College Library, and under Reducing Textbook Costs, to help you secure the Strongly Recommended resources successfully.

Textbook Editions

Textbook editions listed in the UExcel content guides may not be the same as those listed in the bookstore. Textbook editions may not exactly match up in terms of table of contents and organization, depending upon the edition. However, our team of exam developers checks exam content against every new textbook edition to verify that all subject areas tested in the exam are still adequately available in the study materials. If needed, exam developers will list additional Strongly Recommended resources to ensure that all topics in the exam are still sufficiently covered. Public libraries may have the textbooks you need, or may be able to obtain them for you through interlibrary loan to reduce textbook costs. You may also consider financial aid, if you qualify, to further help defray the steep cost of textbooks. A section on open educational

resources (OER) has been included in this guide to help you locate additional, possibly free resources to augment your study.

Strongly Recommended

Sullivan, M. (2017). *Statistics: Informed decisions using data* (5th ed.). Upper Saddle River, NJ: Pearson.

NOTE: We recommend that during your study, you perform all calculations using a basic, 8-function calculator, so that you will be well prepared to do similar calculations using the online calculator at the Pearson testing center.

The study materials may be purchased from the [Excelsior College Bookstore](#).

Optional Resources

The examination development committee did not identify any specific Optional resources for this exam. If you would like to explore topics in more depth, we encourage you to refer to available Open Educational Resources (OER).

Reducing Textbook Costs

Many students know it is less expensive to buy a used textbook, and buying a previous edition is also an option. The Excelsior College bookstore includes a buyback feature and a used book marketplace, as well as the ability to rent digital versions of textbooks for as long as students need them. Students are encouraged to explore these and the many other opportunities available online to help defray textbook costs.

Open Educational Resources

There are many resources available online free of charge that may further enhance your study for the exam. Known as Open Educational Resources (OER), these may be textbooks, courses, tutorials, or encyclopedias. Any additional OER that you find independently should be used to augment study—not as replacements for the Strongly Recommended resources.

Most sites for university-based OER can be searched through www.ocwconsortium.org and/or www.oercommons.org.

Sites that specialize in web courses designed by college professors under contract with the website sponsor, rather than in web versions of existing college courses, include:

www.education-portal.com

www.opencourselibrary.org (abbreviated as OCL)

We have included specific courses that cover material for one or more UExcel® exams from the sites in the listings above. It's worth checking these sites frequently to see if new courses have been added that may be more appropriate or may cover an exam topic not currently listed.

Sites like Khan Academy (www.khanacademy.com) and iTunes U feature relatively brief lessons on very specific topics rather than full courses. Full courses are also available on iTunes U (<http://www.apple.com/education/ipad/itunes-u/>). We have chosen a few courses and collections for this listing.

Open Online Textbooks

BookBoon

<http://bookboon.com/en/textbooks-ebooks>

Flatworld Knowledge

<http://catalog.flatworldknowledge.com/#our-catalog>

College Readiness

Khan Academy

<http://www.khanacademy.org/>

Hippocampus

<http://www.hippocampus.org/>

Open Course Library

<http://opencourselibrary.org/collg-110-college-success-course/>

Study Aids

Education Portal

<http://education-portal.com/>

Khan Academy

<http://www.khanacademy.org/>

Annenberg Learner

<http://www.learner.org/>

OpenCourseWare

<http://ocwconsortium.org/en/courses/search>

OER Commons

<http://www.oercommons.org/>

Open Course Library

<http://www.opencourselibrary.org/>

To achieve academic success, rate yourself at Excelsior College's Self-Regulated Learning Lab. Visit the Diagnostic Assessment & Achievement of College Skills site at <https://srl.daacs.net/>

It's free!

SECTION TWO

Content Outline

General Description of the Examination

The UExcel Statistics examination is based on material typically taught in a one-semester introductory course in statistics. It measures knowledge and understanding of the fundamental concepts of descriptive and inferential statistics, and the meaning and application of basic statistical ideas.

Those beginning to study for this exam should have a basic knowledge of algebra.

Learning Outcomes

After you have successfully worked your way through the recommended study materials, you should be able to demonstrate the following learning outcomes:

1. Define, organize, and examine data. (Aligns to GECC 2.2)
2. Perform standard statistical calculations. (Aligns to GECC 2.2)
3. Recognize and interpret several types of data. (Aligns to GECC 2.2)
4. Use graphical and numerical summaries. (Aligns to GECC 2.2)
5. Apply standard statistical inference procedures. (Aligns to GECC 2.2)
6. Draw valid conclusions from your analysis of data. (Aligns to GECC 2.2)

General Education Career Competencies Addressed in this Exam

GECC-2: Mathematical and Scientific Problem Solving: Apply mathematical concepts and reasoning to solve problems that involve quantitative information.

Content Outline

The content outline describes the various areas of the test, similar to the way a syllabus outlines a course. To fully prepare requires self-direction and discipline. Study involves careful reading, reflection, and systematic review.

The major content areas on the Statistics examination, the percent of the examination, and the hours to devote to each content area are listed below.

Content Area	Percent of the Examination	Hours of Study*
I. Overview of Statistics	5%	7
II. Summarizing, Organizing, and Describing Data	20%	27
III. Regression and Correlation	10%	14
IV. Basic Probability Theory	10%	14
V. Probability Distributions	10%	14
VI. Sampling	10%	14
VII. Statistical Estimation	15%	20
VIII. Hypothesis Testing	20%	27
Total	100%	

*Approximate: For those examinees who know the topic well, less time may be needed to learn the subject matter. For those who are new to the subject matter, more time may be required for study.

NOTE: Occasionally, examples will be listed for a content topic to help clarify that topic. However, the content of the examination is not limited to the specific examples given.

I. Overview of Statistics

5 PERCENT OF EXAM

Ch. 1, 2

- A. Descriptive vs. inferential statistics (populations–samples, parameters–statistics)
- B. Uses and misuses of statistics

C. Counting and measuring

- 1. Measurement scales (nominal, ordinal, interval, ratio)
- 2. Discrete vs. continuous variables

D. Collection of data (random samples, probability samples, samples of convenience)

II. Summarizing, Organizing, and Describing Data

20 PERCENT OF EXAM

Ch. 2, 3

- A. Measures of central tendency
 - 1. Mean (population and sample)

2. Median
3. Mode

B. Measures of variation

1. Range
2. Variance (population and sample)
3. Standard deviation (population and sample)
4. Interquartile range

C. Organizing data

1. Ordering or ranking
2. Distributions
 - a. Frequency
 - b. Relative frequency
 - c. Cumulative frequency
3. Pictorial displays (quantitative, qualitative)
 - a. Histogram
 - b. Frequency polygon
 - c. Box-and-whisker plot
 - d. Stem-and-leaf display

D. Measures of relative position

1. Rank
2. Quartiles
3. Percentiles
4. Standardized scores (z-scores)

E. Interpreting descriptive measures

1. Symmetry and skewness
2. Comparative characteristics of measures of central tendency
3. Unimodal vs. bimodal distributions
4. Coding data/effects of adding and multiplying by constants
5. Effects of outliers on descriptive measures

III. Regression and Correlation

10 PERCENT OF EXAM

Ch. 4

A. Scatterplots/diagrams

B. Least squares regression line

1. Calculation of coefficients
2. Prediction

C. Correlation coefficient r and coefficient of determination (R^2) — calculation and interpretation

IV. Basic Probability Theory

10 PERCENT OF EXAM

Ch. 4

A. Possibilities and probabilities

1. Counting principles
 - a. Basic counting rule — multiplication principle
 - b. Permutations
 - c. Combinations
2. Sample spaces
3. Events
 - a. Mutually exclusive
 - b. Union, intersection, complement
4. The concept of a probability
 - a. Relative frequency
 - b. Theoretical (classical) probability
 - c. Conditional probability

B. Rules of probability

1. Complement rule
2. Addition rules
 - a. Mutually exclusive events
 - b. Non-mutually exclusive events
3. Multiplication rules
 - a. Independent events

- b. Dependent events

- g. Normal approximation of binomial distribution (using continuity correction)

V. Probability Distributions

10 PERCENT OF EXAM

Ch. 6, 7

A. Discrete random variables and their distributions

1. Basic concepts
 - a. Probability distributions and probability functions
 - b. Mean (expected value)
 - c. Variance and standard deviation
2. Binomial distributions
 - a. Properties of a binomial experiment
 - b. Parameters of binomial distributions (n, p)
 - c. Calculation of binomial probabilities
 - 1) Formula
 - 2) Use of table
 - d. Mean and standard deviation
 - e. Related word problems

B. Continuous random variables and their distributions

1. Basic concepts
 - a. Probability as area under the curve
 - b. Interpretation of mean and standard deviation
2. Normal distributions
 - a. Properties of the normal curve
 - b. Parameters of the normal distribution — mean (μ) and standard deviation (σ)
 - c. Standard normal distributions
 - d. Use of table of areas for standard normal distribution
 - e. Standardized units (standardized scores, z-scores)
 - f. Use of area tables to solve general normal distribution problems

VI. Sampling

10 PERCENT OF EXAM

Ch. 8

A. Simple random sampling

1. Concept of a random sample
2. Obtaining a simple random sample

B. Sampling distribution of the sample means

1. Shape of sampling distribution
2. Expected value (mean) of the sample mean
3. Standard deviation (standard error) and variance of the sample mean
4. Probabilities based on sampling distribution
5. Central limit theorem and applications

C. Other sampling schemes (for example: stratified, cluster, systematic)

VII. Statistical Estimation

15 PERCENT OF EXAM

Ch. 9

A. Estimation of a single population mean

1. Large sample or sample with known variance (using z-statistic)
 - a. Point estimation
 - b. Interval estimation (confidence intervals)
2. Small sample from normal populations (using t-statistic)
 - a. Point estimation
 - b. Student's t distribution
 - c. Interval estimation (confidence intervals)

B. Estimation of population proportions using the normal approximation (for large samples, only)

1. Point estimate (sample proportion)
 2. Mean and standard deviation of sample proportion
 3. Interval estimation (confidence intervals)
- C. Estimation of the difference between two population means (for large samples, only)**
1. Matched pairs (dependent samples)
 - a. Point estimate
 - b. Confidence interval
 2. Large independent samples or samples with known variances
 - a. Point estimate
 - b. Confidence interval
 3. Small independent samples from normal distributions with equal variances
 - a. Point estimate
 - b. Confidence interval
- D. Estimation of the difference between two population proportions (for large samples, only)**
1. Point estimate of difference
 2. Mean and standard deviation of differences of proportions
 3. Interval estimate of differences of proportions

VIII. Hypothesis Testing

20 PERCENT OF EXAM

Ch. 9, 10, 11, 12

- A. Testing hypotheses for a single population mean**
1. Formulating hypotheses (null vs. alternative)
 - a. Large sample case (using z test)
 - b. Small sample case (using t test)
 2. Decisions based on P -values or critical values
 3. Type I and Type II errors
- B. Testing hypotheses for population proportions (for large samples, only)**
1. Formulating hypotheses (null vs. alternative)
 2. Decisions based on P -values or critical values
 3. Type I and Type II errors
- C. Testing hypotheses for the difference between two population means**
1. Large independent samples or samples with known population variances (z test)
 2. Small independent samples from normal distributions with unknown, but assumed equal variance (t test)
 3. Matched-pairs samples (t test)
- D. Testing hypotheses for the difference between two population proportions (for large samples, only)**
- E. Chi-square tests**
1. Goodness of fit
 2. Independence in two-way contingency tables

SECTION THREE

Sample Questions

The sample questions give you an idea of the level of knowledge expected in the exam and how questions are typically phrased. They are not representative of the entire content of the exam and are not intended to serve as a practice test.

Rationales for the questions can be found on pages 18–21 of this guide. In that section, the correct answer is identified and each answer is explained. The number in parentheses at the beginning of each rationale refers to the corresponding section of the content outline. For any questions you answer incorrectly, return to that section of the content outline for further study.

You will be provided with an erasable white board to use during your exam. During your exam, tables of necessary formulas will be available for your reference and you will have access to a basic 8-function calculator on the computer. The calculator button is in the top left hand corner of the page as each question is presented and the tables and formulas are in the Formulas button located in the lower left hand corner as each question is presented. A list of the formulas is printed at the back of this content guide along with a picture of the calculator that will be available for your use during the exam.

1. What is the mean of the set of data below?
1, 1, 2, 2, 2, 4, 6, 7, 9, 10, 11
 - 1) 5
 - 2) 2
 - 3) 6
 - 4) 4
2. A random sample of 5 test scores has a mean of 82 points on a scale of 0 – 100, with a variance of zero. What is the range of these test scores?
 - 1) 0
 - 2) 50
 - 3) 82
 - 4) 100
3. A stem-and-leaf display of a set of data is shown below:

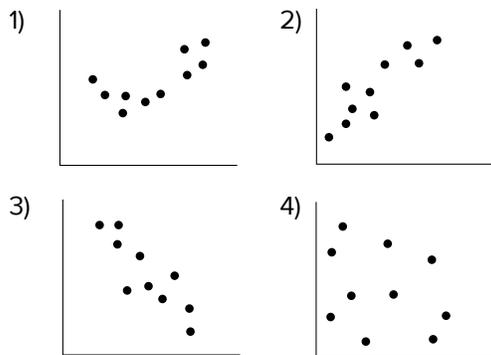
2		3 4 5
3		0 1 1 2
4		1 2 5 5 5 7 8 9
5		1 1 2 3 5
6		2 3 5
7		0 2

Leaf Unit = 1.0

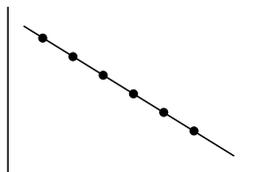
What is the median of the data set?

 - 1) 45
 - 2) 45.5
 - 3) 47
 - 4) 49
4. A set of scores has a mean of 70 and a standard deviation of 4. Which score has a standardized score of -2.5 ?
 - 1) 55
 - 2) 60
 - 3) 65
 - 4) 80
5. If the number k were added to each value in a set of data, which measure would remain unchanged?
 - 1) mean
 - 2) median
 - 3) mode
 - 4) range

6. Which of the following scatterplots would have a correlation coefficient closest to zero?



7. Given the regression equation $y = -3 + 0.5x$, which is true?
- 1) The value of y increases 1 unit for every 2 units of increase in x .
 - 2) The value of y increases 2 units for every 1 unit of increase in x .
 - 3) The value of y is 3 units less than x .
 - 4) The correlation between x and y is negative.
8. Base your answer to this question on the scatter diagram below:



If the regression line $\hat{y} = 3 - 0.5x$ fits the points on the scatter diagram perfectly, what is the value of the correlation coefficient r ?

- 1) 1
 - 2) -1
 - 3) 0.5
 - 4) -0.5
9. How many different radio station call letter combinations could there be if the first letter must be a W or a K and the whole station name must have three letters?
- 1) 54
 - 2) 676
 - 3) 1352
 - 4) 17,576

10. Assume that events A and B are mutually exclusive, with $P(A) = .4$ and $P(B) = .5$. What is $P(A \text{ or } B)$?

- 1) 0
- 2) .2
- 3) .7
- 4) .9

11. Which of the following is a probability distribution for a discrete random variable?

- 1)

x	$P(x)$
0	0.6
1	0.6
2	-0.2
- 2)

x	$P(x)$
0	0.7
1	-0.2
2	-0.1
- 3)

x	$P(x)$
0	0.1
1	0.3
2	0.6
- 4)

x	$P(x)$
0	0.3
1	0.3
2	0.3

12. What are the mean (μ) and standard deviation (σ) of a binomial distribution where $n = 60$ and $p = 1/6$?

- 1) $\mu = 10$ and $\sigma = 2.89$
- 2) $\mu = 10$ and $\sigma = 8.33$
- 3) $\mu = 30$ and $\sigma = 3.87$
- 4) $\mu = 30$ and $\sigma = 15$

13. Assume that the grades of individuals taking a proficiency examination are distributed normally with an average score of 75 and a standard deviation of 5. The minimum passing grade on the examination is 70. What is the approximate proportion of individuals who fail the examination?

- 1) .16
- 2) .34
- 3) .68
- 4) .84

14. Which is an accurate statement with regard to a simple random sample?
- 1) The population is divided into stratified groups.
 - 2) The sample consists of every n th subject.
 - 3) The sample uses only subjects that have been screened for common traits.
 - 4) Samples of the same size have the same probability of being selected.
15. Given a normally distributed population with a mean of 72 and a standard deviation of 12, what is the standard error for the distribution of sample means for samples of size 36?
- 1) 12
 - 2) 2
 - 3) 36
 - 4) 72
16. To get a sample of size 20 from the Fortune 500 companies, a statistician began by choosing a random integer (which turned out to be 16) from among the integers 1 to 25. The sample consisted of the companies with the following rankings:
- 16 41 66 91 116 141 166 191 216 241
266 291 316 341 366 391 416 441 466 491
- Which sampling scheme was used?
- 1) cluster
 - 2) simple random
 - 3) stratified
 - 4) systematic
17. A change in which value would move the midpoint of the confidence interval for the population mean?
- 1) sample size
 - 2) sample mean
 - 3) sample standard deviation
 - 4) confidence level
18. Which of the following pairs of procedures would increase the length of a confidence interval for the population mean? (Assume σ remains constant.)
- 1) increasing the confidence level and decreasing the sample size
 - 2) decreasing the confidence level and increasing the sample size
 - 3) increasing both the confidence level and sample size
 - 4) decreasing both the confidence level and sample size
19. A random sample of size 5 from a normal distribution, whose mean and variance are unknown, yields a sample mean of 27.75 and a sample variance of 16. Which of the following is closest to a 95% confidence interval for the true mean?
- 1) 27.75 ± 3.51
 - 2) 27.75 ± 4.60
 - 3) 27.75 ± 4.97
 - 4) 27.75 ± 14.02
20. A college's past experience is that 46% of students accepted for admission will actually enroll at the college. It is assumed that the students act independently and that the 46% probability of acceptance still holds. If 5490 students are accepted, what is a 99% confidence interval for the number who will enroll?
- 1) (2430, 2620)
 - 2) (2453, 2597)
 - 3) (2465, 2585)
 - 4) (0.443, 0.477)
21. In testing the hypotheses $H_0: \mu = \mu_0$ and $H_a: \mu \neq \mu_0$ based on a sample of size $n = 36$, assume that the population standard deviation is known and the value of the test statistic is $z = 1.71$. What is the approximate P -value?
- 1) .044
 - 2) .050
 - 3) .087
 - 4) .100

22. A group of researchers plan to test the null hypothesis $H_0: \mu_1 - \mu_2 = 0$ by drawing independent samples of size $n = 15$ and $n = 12$, respectively, from two normally distributed populations. The population variances are unknown, but are assumed to be equal. Which statement best describes part of the test procedures?
- 1) Use test statistic t and the pooled variance calculated from the sample variances.
 - 2) Use test statistic t but not the pooled variance calculated from the sample variances.
 - 3) Use test statistic z and the pooled variance calculated from the sample variances.
 - 4) Use test statistic z but not the pooled variance calculated from the sample variances.
23. An insurance company that currently sells only automobile insurance is planning to introduce homeowners insurance to its customers. The management has indicated that they will introduce homeowners insurance if more than 40% of their current customers indicate that they will purchase the new insurance. A random sample of 500 customers was used to test $H_a: p > .40$. The value of the test statistic was computed to be 2.8. Let α be the significance level. What is the appropriate conclusion?
- At $\alpha = 0.05$,
- 1) there is sufficient evidence to conclude that homeowners insurance should not be introduced.
 - 2) there is insufficient evidence to conclude that homeowners insurance should be introduced.
 - 3) there is sufficient evidence to conclude that homeowners insurance should be introduced.
 - 4) there is insufficient evidence to conclude that more than 80% of current customers will purchase homeowners insurance.
24. A researcher developed a method to treat stomach ulcers. The researcher found that 47% of patients in the treatment group (sample size = 82) were cured, and that 38% of patients in the control group (sample size = 78) were cured. Let P_1 = the proportion cured in the population of those taking treatment. Let P_2 = the proportion cured in the population represented by the control group. The z test for $H_0: p_1 = p_2$ is closest to which value?
- 1) 0.7
 - 2) 1.15
 - 3) 1.6
 - 4) 2.53
25. A researcher wishes to know if there is a relationship between gender and a person's preference of color in an automobile. Male and female customers at a car dealership are shown a particular model of car in each of four colors and are asked to state their preference. Which would be the most appropriate test to determine whether men and women have different preferences?
- 1) chi-square test for goodness of fit
 - 2) chi-square test for independence of effects
 - 3) two-sample t test for comparing means
 - 4) z test for comparing means

SECTION FOUR

Rationales

1.(IIA1)

- *1. The mean is the sum of the set of values ($1 + 1 + 2 + \dots + 11 = 55$) divided by the number of values (11): $55/11 = 5$
2. 2 is the mode of the data set.
3. 6 is not the mean.
4. 4 is the median of the data set.

2.(IIB1)

- *1. Since the variance is zero, there is no variation. All the values are the same (all the test scores are 82), so the range is zero.
2. 50 is the midpoint of the test scale.
3. 82 is the mean of the test scores.
4. 100 is the range of the test scale.

3.(IIC3d)

1. 45 is the 12th ranked measure; therefore, it is not the median. 45 is the mode of the set of data.
2. 45.5 is not the 13th ranked observation; therefore, it is not the median.
- *3. The rank of the median is $\frac{n+1}{2} = \frac{(25+1)}{2} = 13$
The median is the 13th ranked observation.
The 13th ranked observation is 47.
4. 49 is not the 13th ranked observation; therefore, it is not the median.

*correct answer

4.(IID4)

1. The standardized score of 55 is $\frac{(55-70)}{4} = -3.75$
- *2. The formula for the standardized score is $z = \frac{(x - \mu)}{\sigma}$
The standard score of 60 is $\frac{(60-70)}{4} = -2.5$
3. The standard score of 65 is $\frac{(65-70)}{4} = -1.25$
4. The standard score of 80 is $\frac{(80-70)}{4} = 2.5$

5.(IIE4) Assuming that $k \neq 0$,

1. the mean will be increased by k/n if k is positive.
2. the median will change as every number is shifted by k units.
3. the mode will change because every value in the data set is changed.
- *4. the range will remain unchanged. The lowest and highest observations will change by the same amount, so the difference will remain the same.

6.(IIIA,C)

1. This scatterplot shows a weak positive relationship; therefore, the correlation coefficient is a small positive number, but is not closest to zero.
2. This scatterplot shows a strong positive relationship; therefore, the correlation coefficient is a positive number close to one.
3. This scatterplot shows a strong negative relationship; therefore, the correlation coefficient is a negative number close to -1.
- *4. This scatterplot shows a random pattern relationship; therefore, the correlation coefficient is a number closest to zero.

7.(IIIB)

- *1. Because the slope = $f_i = 0.5$, for each two-unit increase in x there is a one-unit increase in y .
2. Here, x and y are incorrectly reversed.
3. The value of y is actually 3 units less than $0.5x$.
4. The correlation between x and y is positive because the slope of the regression line is positive.

8.(IIIC)

1. The slope of the regression line is negative, so the correlation must be negative.
- *2. The slope is negative and all points fit the line perfectly. This is a perfect negative linear relationship; correlation coefficient $r = -1$.
3. When the points fit the line perfectly, the correlation can only be 1.00 or -1.00.
4. See 3).

9.(IVA1a)

1. $54 = (2)(3)(3)(3)$ which does not represent the number of any three-letter combinations.
2. $676 = (1)(26)(26)$ which represents the number of three-letter combinations where the first letter is W only or R only.
- *3. $1352 = (2)(26)(26)$ which represents the number of three-letter combinations where the first letter must be a W or a K.
4. $17,576 = (26)(26)(26)$ which represents the number of any three-letter combinations.

10.(IVB2a)

1. $0 = P(A \text{ and } B)$.
2. If A and B are independent, then $P(A \text{ and } B) = P(A)P(B) = (.4)(.5) = .2$.
3. If A and B are independent, then $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .7$.
- *4. Since A and B are mutually exclusive, then $P(A \text{ or } B) = P(A) + P(B) = .4 + .5 = .9$.

11.(VA1a)

1. This is not a probability distribution because it has a negative entry.
2. This is not a probability distribution because it has two negative entries.
- *3. A probability distribution must satisfy these rules: $P(x)$ can only be between 0 and 1 inclusive, and the sum of the $P(x)$ values must be equal to 1. This distribution satisfies both rules.
4. This is not a probability distribution because the sum of $P(x)$ values is not 1.

12.(VA2d)

- *1. $= np = 60 \frac{1}{6} = 10; \sigma = \sqrt{np(1-p)}$
 $= \sqrt{60 \frac{1}{6} \frac{5}{6}} = \sqrt{8.33} = 2.89$
2. $= np = 60 \frac{1}{6} = 10; 8.33 = (2.89)^2 = \text{the variance}$
3. 30 and 3.87 are the mean and standard deviation of a binomial distribution with $n = 60$ and $p = \frac{1}{6}$ and $p = \frac{1}{6}$.
4. 30 and 15 are the mean and variance of a binomial distribution with $n = 60$, and $p = \frac{1}{6}$.

13.(VB2f)

- *1. $P(\text{fail}) = P(x < 70) = P(z < \frac{70-75}{5})$
 $= P(z < -1) = .1587 \approx .16$
2. $.34 = P(70 < x < 75)$
3. $.68 = P(70 < x < 80)$
4. $.84 = P(x > 70) = P(\text{pass})$

14.(VIA2)

1. When the population is divided into stratified groups, it is a stratified sample.
2. When the sample consists of every n th subject, it is a systematic sample.
3. When the sample uses only subjects that have been screened for common traits, it is a judgment or nonprobabilistic sample.
- *4. When samples of the same size have the same probability of being selected, it is a simple random sample. Each set of n units has an equal chance of being selected.

*correct answer

15.(VIB3)

- 12 is the standard deviation of the population.
- The standard error of the sample means is

$$\frac{s}{\sqrt{n}} = \frac{12}{\sqrt{36}} = 2$$
- 36 is the sample size.
- 72 is the mean of the population.

16.(VIC)

- Cluster sampling is based on the random selection of clusters of elements from a population.
- In simple random sampling, every possible sample of a given size has the same chance of being selected.
- In stratified random sampling, first the population is divided into strata, then a random sample is selected from each stratum.
- This is a classic case of systematic sampling. The first item (#16) is randomly chosen. Then items are chosen at fixed intervals (every 25th).

17.(VIIA)

- A change of sample size will change the length of the confidence interval for the population mean.
- A change of sample mean will change the midpoint of the confidence interval for the population mean.
- A change of sample standard deviation will change the length of the confidence interval for the population mean.
- A change of confidence level will change the length of the confidence interval for the population mean.

18.(VIIA1)

- Increasing the confidence level and decreasing the sample size will increase the length of the confidence interval.
- Decreasing the confidence level and increasing the sample size will decrease the length of the confidence interval.
- Increasing both the confidence level and the sample size may increase or decrease the length of the confidence interval.
- Decreasing both the confidence level and the sample size may increase or decrease the length of the confidence interval.

19.(VIIA2c) Use t because sample size is small.

- $27.75 \pm 3.51 = \bar{x} \pm z_{.025} \frac{s}{\sqrt{n}}$
- $27.75 \pm 4.60 = \bar{x} \pm z_{.025} \frac{s}{\sqrt{n}}$
- $n = 5, \bar{x} = 27.75, s^2 = 16$
The 95% confidence interval for the true mean is

$$\bar{x} \pm t_{4,.025} \frac{s}{\sqrt{n}} = 27.75 \pm 2.776 \frac{4}{\sqrt{5}}$$

$$= 27.75 \pm 4.97$$
- $27.75 \pm 14.02 = \bar{x} \pm z_{.025} \frac{s^2}{\sqrt{n}}$

20.(VIIB3)

- $(2430, 2620) = (2525 - 95, 2525 + 95)$
The number of students enrolled is a binomial distribution with $n = 5490, p = .46$, which is approximately normally distributed with mean = $np = 2525$ and standard deviation = $\sqrt{np(1-p)} = 37$.
Therefore, a 99% confidence interval for the number of students who will enroll is $2525 \pm (z_{.005})(37) = 2525 \pm (2.57)(37) = 2525 \pm 95$.
- $(2453, 2597) = (2525 - 72, 2525 + 72) = 2525 \pm (z_{.005})(37)$
- $(2453, 2585) = (2525 - 60, 2525 + 60) = 2525 \pm (z_{.025})(37)$
- $(0.443, 0.477) = \frac{2430}{5490}, \frac{2620}{5490}$ is the 99% confidence interval for the proportion of students who enroll.

*correct answer

21.(VIII A2)

1. $.044 = P(z > 1.71)$. This is the P -value of a one-sided test.
2. $.05 = P(z < -1.645)$ or $P(z > 1.645)$. This is the P -value of a one-sided test when $z = 1.645$.
- *3. $.087 = 2(1 - .9564) = 2P(z > 1.71)$. This is the P -value of the test.
4. $.10 = 2P(z > 1.645)$. This is the P -value of a two-sided test when $z = 1.645$.

22.(VIII C2)

- *1. Since the population variances are unknown but are assumed to be equal, test statistic t and pooled variance calculated from the sample variances should be used.
2. This test procedure is only for normal populations with unknown and unequal variances.
3. This test procedure is only for large sample sizes and populations with unknown and equal variances.
4. This test procedure is only for large sample sizes and populations with unknown and unequal variances.

23.(VIII B2)

1. This conclusion means accept H_0 .
2. This conclusion means do not accept H_a .
- *3. This conclusion means accept H_a . The critical value $z_a = z_{0.5} = 1.645$. $z = 2.8 > 1.645$. Therefore, we reject H_0 and accept H_a .
4. This conclusion means do not claim $p > .80$.

24.(VIII D)

- 1) 0.7 is not closest to 1.15.
- *2) $\hat{p}_1 = .47, \hat{p}_2 = .38, \hat{p} = \frac{(.47)(82) + (.38)(78)}{82 + 78}$
 $= \frac{39 + 30}{160} = \frac{69}{160} = .43$

Therefore, the observed value for the z test is

$$\frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1 - \hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = \frac{.47 - .38}{\sqrt{.43 \cdot .57\left(\frac{1}{82} + \frac{1}{78}\right)}}$$

- 3) 1.6 is not closest to 1.15.
- 4) 2.53 is not closest to 1.15.

25.(VIII E2)

- 1) The chi-square test for goodness of fit is used to determine whether observed data fit a theoretical distribution.
- *2) The chi-square test for independence of effects is most appropriate. "Men and women have different preferences" suggests a test of independence.
- 3) Means are not being compared.
- 4) See 3).

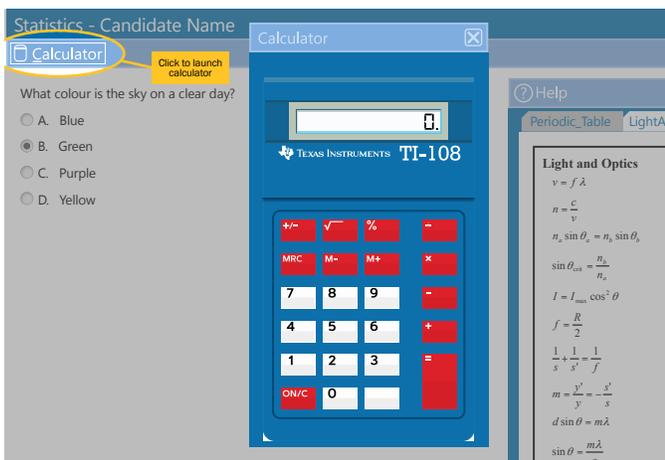
*correct answer

Formula Information

Formulas

The formulas and tables listed below will be provided for your use during the examination. You will also have access to a standard calculator, as shown below.

To use the formulas and table during your computer-delivered examination, click the Formulas button in the lower left corner of any question screen, and select the appropriate tab.



1. Mean
2. Variance
3. Standard deviation
4. Formula for converting to standardized units
5. Number of permutations of n objects taken r at a time
6. Number of combinations of n objects taken r at a time
7. Complement rule
8. General addition rule
9. Addition rule for mutually exclusive (disjoint) events
10. General multiplication rule
11. Multiplication rule for independent events
12. Mean of a discrete random variable
13. Variance of a discrete random variable

14. Binomial distribution
15. Mean (expected value) and standard deviation of a binomial distribution
16. Standard error of the mean
17. Large-sample level C confidence interval for μ
18. Level C confidence interval for p
19. Level C confidence interval for $\mu_1 - \mu_2$ if both populations are normal with equal unknown variances (independent samples)
20. Level C confidence interval for $p_1 - p_2$ if both sample sizes are large
21. Level C confidence interval for $\mu_1 - \mu_2$ for matched pairs samples
22. Variance of difference of two independent means $X_1 - X_2$
23. Large-sample level C confidence interval for difference of two means
24. Test statistic for test concerning mean with known variance
25. Test statistic for small-sample test concerning mean of normal population with unknown variance
26. Test statistic for large independent sample test concerning $(\mu_1 - \mu_2)$ difference of two means
27. Test statistic for small independent sample test concerning $(\mu_1 - \mu_2)$ difference of two means of two normal populations with equal variance
28. Statistic for large-sample test concerning $(p_1 - p_2)$ difference of two proportions of two populations
29. Chi-square statistic for test of goodness of fit
30. Coefficients of least squares line $\hat{y} = a + bx$
31. Computing formula for linear correlation coefficient

Tables

Table I Standard Normal Probabilities

Table II t Distribution Critical Values

Table III Chi-square Critical Values

SECTION FIVE

Taking the Exam

Registering for Your Exam

Register Online

www.excelsior.edu/examregistration

Follow the instructions and pay by Visa, MasterCard, American Express, or Discover Card.

Examination Administration

Pearson Testing Centers serve as the administrator for all Excelsior College computer-delivered exams.

Accessibility Services

Excelsior College is committed to the principle that every individual should have an equal opportunity to enroll in an Excelsior College degree program, to register for courses or examinations in order to demonstrate their knowledge and skills under appropriate conditions, and to complete a degree.

The Accessibility Services Office at Excelsior College is responsible for considering requests for reasonable accommodations for individuals with verifiable, documented disabilities. If you are requesting an accommodation due to a disability/condition, complete a [Request for Accommodation form](#).

Computer-Delivered Testing

The UExcel exams are delivered by computer. You can take this exam either in a [Pearson VUE testing center](#) or at your home or office with an online proctor. If you are interested in remote proctoring, visit [PearsonVUE OnVUE online proctoring](#).

The system is designed to be as user-friendly as possible, even for those with little or no computer

experience. On-screen instructions are similar to those you would see in a paper examination booklet. You will use either the keyboard or the mouse to submit your answers, depending upon the type of question.

Before taking your exam, we strongly encourage you to go on a virtual tour of the testing center. To access this tour, click the What to Expect in a Pearson VUE test center at the following link: home.pearsonvue.com/test-taker/security.aspx

You also will receive a small, erasable whiteboard if you need one.

Breaks

Breaks are only permitted for exams taken at Pearson VUE Testing Centers, and are not permitted during exams delivered via online proctoring.

Online Proctoring

As of spring 2021, Excelsior is offering an [online delivery option for UExcel exams](#), using OnVUE, Pearson VUE's online delivery and proctoring service.

You must use a personal (vs. an employer's) computer if you want to take the exam online and not in a testing center, so the exam can be effectively delivered to you.

Breaks are not allowed during an exam taken online from home. You may not leave your seat during an online-proctored exam, so be prepared to sit for two or three hours. If you need extra time, the exam will have to be taken at a PearsonVUE Testing Center, and an accommodation formally requested.

NOTE: English Composition, Spanish, Music, and College Writing will NOT be available for online proctoring.

On the Day of Your Exam

Important Reminders

On the day of your exam, remember to:

- dress comfortably: the computer will not mind that you're wearing your favorite relaxation outfit
- arrive at the test site rested and prepared to concentrate for an extended period
- allow sufficient time to travel, park, and locate the test center
- be prepared for possible variations in temperature at the test center due to weather changes or energy conservation measures
- bring your ID, but otherwise, don't weigh yourself down with belongings that will have to be kept in a locker during the test.

Academic Integrity Nondisclosure Statement

- All examinees must agree to the terms of the Excelsior College Academic Integrity Policy before taking an examination. The agreement will be presented on screen at the Pearson VUE Testing Center before the start of your exam.
- Once the examinee agrees to the terms of the Academic Integrity Nondisclosure Agreement (NDA), the exam will begin.

If you choose not to accept the terms of the agreement

- your exam will be terminated
- you will be required to leave the testing center
- you will not be eligible for a refund. For more information, review the Student Policy Handbook at www.excelsior.edu/studentpolicyhandbook.

Student behavior is monitored during and after the exam. Electronic measures are used to monitor the security of test items and scan for illegal use of intellectual property. This monitoring includes surveillance of Internet chat rooms, websites, and other public forums.

UExcel Grade Report

After you complete the exam, you will be issued a UExcel Grade Report for Examinations. See the [sample UExcel Grade Report](#) in this content guide.

Grade Appeals

If you believe that your score grade is incorrect, you may appeal your grade to examcredit@excelsior.edu. Details about the appeals process are in the [Student Handbook](#).

What If I Miss My Appointment?

If you don't cancel or reschedule your testing appointment 24 hours before your test appointment, you will have to pay the full fee of the exam, even if you don't show up.

Late Arrivals

You will also forfeit the exam fee if you arrive to the test center more than 15 minutes late.

Information About UExcel Exams for Colleges and Universities

A committee of teaching faculty and practicing professionals determines the learning outcomes to be tested on each exam. Excelsior College Center for Educational Measurement staff oversee the technical aspects of test construction in accordance with current professional standards. To promote fairness in testing, we take special care to ensure that the language used in the exams and related materials is consistent, professional, and user friendly. Editorial staff perform systematic quantitative and qualitative reviews to ensure accuracy, clarity, and compliance with conventions of bias-free language usage.

Excelsior College, the test developer, recommends granting three (3) semester hours of lower-level undergraduate credit to students who receive a letter grade of C or higher on this examination. Other colleges and universities also recognize this exam as a basis for granting credit or advanced standing. Individual institutions set their own policies for the amount of credit awarded and the minimum acceptable grade.

Statistics Exam

Development Committee

Sandra Hinchman, PhD (Cornell University, 1978)
Professor, St. Lawrence University

Gary Egan, MA (State University of New York at
Binghamton, Mathematics, 1984)
Assistant Professor, Monroe Community College

Lifang Hsu, PhD (University of California at Santa
Barbara, Mathematical Statistics, 1983)
Associate Professor, Le Moyne College

Wesley Jordan, EdD (Columbia University, Mathematics
Education, 1976)
Professor, Pace University

Gary Kulis, MA (State University of New York at
Binghamton, Mathematics, 1988)
Instructor, Mohawk Valley Community College

Malcolm Sherman, PhD (University of California,
Berkeley, Mathematics, 1964)
Associate Professor, The University at Albany

Sample Grade Report

Excelsior College
GRADE REPORT FOR EXAMINATIONS

Contact ID:

Test Date: 11/21/2020

Letter Grade: C

Examination Code and Title: 210 Statistics

Recommended Credit:
3 Lower Level

Your examination results are expressed as a Letter Grade of A, B, C, or F. Your results are automatically verified when they are received at Excelsior College. If an error is detected, you will be notified immediately.

Recommended Credit is the number of semester hours credit that Excelsior College awards and recommends for your grade. Excelsior College awards and recommends credit for letter grades of C or better.

If you plan to take another examination, you may download free content guides and the User's Guide by visiting our website at www.excelsior.edu/exams/content-guides/.

If you need an Excelsior College Official Examinations Transcript to document the credit you have earned for this examination for another institution, the request can be made online by accessing the Excelsior College website (www.excelsior.edu), logging into your MyExcelsior account, and scrolling down to the For Exams Takers box and clicking on the Request transcripts link. If you do not already have a MyExcelsior username and password, you can obtain one at no cost by accessing the Excelsior College website, clicking the Log In to MyExcelsior button, and then clicking the link "Create a MyExcelsior User Account."



7 Columbia Circle, Albany, New York 12203-5159

Phone | toll free 888-647-2388 or 518-464-8500

TDD | 518-464-8501

Fax | 518-464-8777

excelsior.edu/exams