

EXAM
CODE **116**

CATALOG
NUMBER **MATx116**

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EXAMS**
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Precalculus Algebra

CREDIT
HOURS

3

LEVEL

LOWER

PUBLISHED FEBRUARY 2021

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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 60 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 21, 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 Precalculus Algebra

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. (2016). *College algebra* (10th ed.). Boston: Pearson Prentice Hall.

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 Precalculus Algebra examination is based on material typically taught in a one-semester, three-credit, lower-level course in algebra. The content of the examination corresponds to course offerings such as College Algebra or Precalculus Algebra.

The examination measures knowledge and understanding of graphing, analyzing and applying transcendental and algebraic functions, operations and functions, and the ability to solve equations and inequalities.

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. Translate word problems into algebraic models. (Aligns to GECC 2.2)
2. Solve linear, absolute value, quadratic, rational, radical, polynomial, exponential, and logarithmic equations. (Aligns to GECC 2.2)
3. Use various factoring techniques. (Aligns to GECC 2.2)
4. Graph, recognize, and analyze common and important functions. (Aligns to GECC 2.2)
5. Solve linear, absolute value, and quadratic inequalities. (Aligns to GECC 2.2)
6. Evaluate functions and use function notation. (Aligns to GECC 2.2)
7. Understand and apply the algebra of functions, including composition and inverse. (Aligns to GECC 2.2)
8. Analyze and apply linear, quadratic, polynomial, rational, exponential, and logarithmic functions. (Aligns to GECC 2.2)
9. Solve systems of linear equations in two variables. (Aligns to GECC 2.2)
10. Use properties of exponential and logarithmic expressions to manipulate algebraic expressions. (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 Precalculus Algebra 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. Equations and Inequalities	15%	20
II. Graphs and Functions	25%	34
III. Linear and Quadratic Functions	20%	27
IV. Polynomial and Rational Functions	10%	14
V. Algebra of Functions	10%	14
VI. Exponential and Logarithmic Functions	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. Equations and Inequalities

15 PERCENT OF EXAM

Ch. 1, Equations and Inequalities

Ch. 8, Systems of Equations and Inequalities

A. Equations

1. Linear
2. Quadratic and quadratic in form
3. Rational

4. Radical
5. Polynomial equations of higher degree
6. Absolute value

B. Inequalities

1. Linear
2. Absolute value
3. Quadratic

C. Complex numbers

D. Application and problem solving process

1. Problem set-up
 - a. Simple interest
 - b. Uniform motion
2. Unit of measurement

E. Systems of linear equations: substitution and elimination

II. Graphs and Functions

25 PERCENT OF EXAM

Ch. 2, Graphs

Ch. 3, Functions and Their Graphs

- A. Distance and midpoint formulas
- B. Graphs of equations in two variables
 - 1. Lines
 - a. Slope-intercept and point-slope form
 - b. Intercepts
 - 2. Circles
 - 3. Symmetry with respect to x -axis, y -axis, and origin
- C. Functions and their graphs
 - 1. Domain and range
 - 2. Evaluation of functions
 - 3. Even and odd functions
 - 4. Increasing, decreasing, and constant functions
- D. Graphs of common functions
 - 1. Identity function $f(x) = x$
 - 2. Square function $f(x) = x^2$
 - 3. Cube function $f(x) = x^3$
 - 4. Square root function $f(x) = \sqrt{x}$
 - 5. Reciprocal function $f(x) = \frac{1}{x}$
 - 6. Absolute value function $f(x) = |x|$
- E. Piecewise-defined functions
- F. Transformations of graphs
 - 1. Horizontal and vertical shifts
 - 2. Horizontal and vertical reflections
 - 3. Horizontal and vertical compression and stretching
- G. Mathematical modeling: problem set-up

III. Linear and Quadratic Functions

20 PERCENT OF EXAM

Ch. 4, Linear and Quadratic Functions

- A. Linear functions
 - 1. Average rate of change
 - 2. Supply and demand
 - 3. Revenue and cost
- B. Quadratic functions
 - 1. Completing the square to find the vertex
 - 2. Graphing using vertex and axis of symmetry
- C. Quadratic models: problem set-up

IV. Polynomial and Rational Functions

10 PERCENT OF EXAM

Ch. 5, Polynomial and Rational Functions

- A. Polynomial functions
 - 1. Power function $f(x) = x^n$ and its properties
 - 2. Zeroes of a polynomial
 - 3. Factor theorem
 - 4. Rational zeroes theorem
 - 5. Fundamental theorem of algebra
 - 6. Conjugate pairs: forming a polynomial function
- B. Rational functions
 - 1. Finding the domain algebraically
 - 2. Horizontal and vertical asymptotes
 - 3. Finding the domain and range from a graph

V. Algebra of Functions

10 PERCENT OF EXAM

Ch. 6, Exponential and Logarithmic Functions

- A. Arithmetic with functions
- B. Composition of functions
- C. One-to-one functions
- D. Inverse functions
 - 1. Relationship between domain and range of f , and domain and range of f^{-1}
 - 2. Finding f^{-1} from equation of f , when it exists
 - 3. Geometric relationship between graphs of f and f^{-1}

- D. Logarithmic and exponential equations with common and different bases

E. Exponential growth and decay

- 1. Compound interest
- 2. Uninhibited population growth and radioactive decay
- 3. Continuous compounding of interest

VI. Exponential and Logarithmic Functions

20 PERCENT OF EXAM

Ch. 6, Exponential and Logarithmic Functions

- A. Exponential functions and their properties
 - 1. Graphing
 - 2. Domain, range, and asymptote
 - 3. The natural exponential base e
 - 4. Solving exponential equations with the same base
- B. Logarithmic functions and graphs
 - 1. Definition of logarithm
 - 2. Conversion of an equation between logarithmic and exponential forms
 - 3. Domain, range, and asymptote
 - 4. Graphs
 - 5. Common and natural logarithms
- C. Properties of logarithms
 - 1. Product, quotient, and power properties
 - 2. Condensing and expanding logarithmic expressions
 - 3. Change-of-base formula

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 15–16 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 scientific 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 copy of the formulas and a picture of a typical scientific (non-graphing) calculator are provided at the back of this content guide.

1. What is the slope-intercept form of the equation of the line that passes through points $(-2, 3)$ and $(1, 2)$?
 - 1) $y - 3 = -\frac{1}{3}(x + 2)$
 - 2) $y - 3 = -3(x + 2)$
 - 3) $y - 3 = -\frac{1}{3}(x + 2)$
 - 4) $y = -3x - 3$
2. What is the vertex of a quadratic function $f(x) = 3x^2 - 12x + 17$ by completing the square?
 - 1) $(2, 13)$
 - 2) $(5, 2)$
 - 3) $(17, 2)$
 - 4) $(2, 5)$
3. A vehicle is traveling at 60 mph and its initial position is 35 miles from Point A at $t = 0$. What is the linear function that expresses the position (x) of the vehicle at time t when the vehicle is moving away from Point A following a straight-line path?
 - 1) $x = 35t + 60$
 - 2) $x = 60t + 35$
 - 3) $x = 60t - 35$
 - 4) $x = 35 - 60t$
4. According to the factor theorem, which is a factor of $4x^6 - 37x^4 + 59x^2 + 100$?
 - 1) $x - 100$
 - 2) $x - 2$
 - 3) $x + 1$
 - 4) $x + 25$
5. Which polynomial is of degree 3, has real coefficients, 4 and $3 + 2i$ as zeroes, and a leading coefficient 1?
 - 1) $x^3 - 10x^2 + 37x - 52$
 - 2) $x^3 - 10x^2 + 37x + 52$
 - 3) $x^2 - (2i + 7)x + (8i + 12)$
 - 4) $x^3 - 6x^2 + 13x$

6. Suppose that $f(x) = 1 - \sqrt{x}$. What is the domain of f^{-1} ?
- 1) $(-\infty, 1]$
 - 2) $[0, \infty)$
 - 3) $(-\infty, \infty)$
 - 4) $[1, \infty)$
7. What are the domain and horizontal asymptote for $g(x) = \left(\frac{1}{2}\right)^x$?
- 1) $(-\infty, \infty)$; $y = 0$
 - 2) $(0, \infty)$; $y = 0$
 - 3) $(-\infty, \infty)$; $x = 0$
 - 4) $(0, \infty)$; $x = 0$
8. A person wishes to purchase an SUV for \$25,000. The person wants a loan in the purchase amount from a bank imposing these terms: 3.9% compounded monthly for a period of 5 years. If the person pays nothing until the 5-year period ends, how much will he or she have to pay at that time?
- 1) \$498.71
 - 2) \$506.22
 - 3) \$29,875.00
 - 4) \$30,373.17

SECTION FOUR

Rationales

1.IIB1a

1. The equation is not in slope-intercept form.
2. The equation is not in slope-intercept form and this result indicates that the incorrect slope has been calculated.
- *3. The equation passes through the points given and is in slope-intercept form.
4. The equation passes through only one of the points given, because an incorrect slope has been calculated.

2.IIIB1

1. This is the result of forgetting to multiply the 4 that was subtracted by the coefficient 3 of x^2 .
2. One would arrive at (5, 2) by switching x and y .
3. This the result of failing to subtract anything to balance the 4 added in, and switching the x and y ordinates.
- *4. $f(x) = 3x^2 - 12x + 17 = 3(x^2 - 4x) + 17 = 3(x^2 - 4x + 4) + 17 - 12 = 3(x - 2)^2 + 5$.
Vertex is at (2, 5).

3.IIIA1

1. The distance is not proportional to the initial position.
- *2. Distance = speed \times time + initial position. Point A is the origin $x = 60t + 35$
3. The initial position is a positive value.
4. The vehicle is moving away from Point A and the speed must be positive.

4.IVA3

1. This may result from confusing the factor theorem with the rational zeroes theorem.
- *2. Substituting $x = 2$ into the polynomial gives us 0, and the factor theorem tells us that in this case, $x - 2$ factors the polynomial.
3. See 2).
4. See 2).

5.IVA6

- *1. The polynomial satisfies the constraints given.
2. This is the result of making an error while expanding the product of factors.
3. This is the result of forming a polynomial with the zeroes given, but not using a conjugate pair to guarantee real coefficients.
4. This the result of failing to use all the zeroes given.

6.VD1

- *1. Since the domain of $f^{-1} =$ range of f , and the range of f is $(-\infty, 1]$, the domain of f^{-1} must be $(-\infty, 1]$.
2. The interval $[0, \infty)$ is simply the domain of f not f^{-1} .
3. One may attempt to find f^{-1} since it exists: Let $y = 1 - \sqrt{x}$. Solving for x we have $x = (1 - y)^2$. Recall that $x \geq 0$ and $y \leq 1$ for f . Forgetting this when swapping x and y and finding the inverse to be $f^{-1}(x) = (1 - y)^2$ would result in the domain of $(-\infty, \infty)$.
4. An incorrect graph of $f(x) = 1 - \sqrt{x}$ as $y = 1 + \sqrt{x}$ produced the incorrect range of $[1, \infty)$, thus yielding an incorrect domain for f^{-1} .

*correct answer

7.VIA2

- *1. Since g produces a real value for all $x(-\infty, \infty)$, the domain of g is $(-\infty, \infty)$. Furthermore, $(\frac{1}{2})^x$ is always positive and as $x \rightarrow \infty$, $y \rightarrow 0$ but y is never exactly 0.
2. This choice is incorrect for the domain. It implies that $(\frac{1}{2})^x$ is not a real value when x is negative or zero, so $(0, \infty)$ is the range.
3. $x = 0$ would be a vertical asymptote and g has no vertical asymptotes.
4. The domain must be $(-\infty, \infty)$ since $(\frac{1}{2})^x$ exists for all real numbers and the horizontal asymptote must be of the form $y = 0$ not $x = 0$.

8.VIE1

1. See 4).
2. This is the calculation for the monthly payment:
$$A = P(1 + \frac{r}{n})P(1 + \frac{r}{n})^{nt} =$$
$$\$25,000.00(1 + \frac{.039}{12})^{12 \times 5} = \$30,373.17$$
$$\text{Payment} = 30,373.17/60 = \$506.22$$
3. This the result of computing simple interest, rather than compound interest, and adding it to the original cost of the SUV.
- *4. $A = P(1 + \frac{r}{n})P(1 + \frac{r}{n})^{nt} = \$25,000.00(1 + \frac{.039}{12})^{12 \times 5} =$
 $\$30,373.17$

*correct answer

Formula Sheet

Continuous Compounding

$$A = Pe^{rt}$$

Compound Interest

$$A = P \cdot \left(1 + \frac{r}{n}\right)^{nt}$$

Uninhibited Growth or Uninhibited Decay

$$A(t) = A_0 e^{kt}$$

Simple Interest

$$I = Prt$$

Uniform Motion

$$d = rt$$

Distance

$$d(P_1, P_2) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint

$$M = (x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Slope of a Line

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad x_1 \neq x_2$$

Equation of a Vertical Line

$$x = a$$

Point Slope Form of an Equation of a Line

$$y - y_1 = m(x - x_1)$$

Equation of a Horizontal Line

$$y = b$$

Slope-intercept Form of an Equation of a Line

$$y = mx + b$$

Standard Form of an Equation of a Circle with Radius r and Center (h, k)

$$(x - h)^2 + (y - k)^2 = r^2$$

Profit, Revenue, and Cost Function

$$P(x) = R(x) - C(x)$$

Quadratic Function Given its Vertex and One Other Point

$$f(x) = a(x - h)^2 + k$$

Change-of-base

all positive real numbers

$a \neq 1, b \neq 1$ and m are

$$\log_a M = \frac{\log_b M}{\log_b a}$$

Quadratic Equation

$$ax^2 + bx + c = 0 \quad a \neq 0$$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant of a Quadratic Equation

For a quadratic equation $ax^2 + bx + c = 0$:

1. If, $b^2 - 4ac > 0$ there are two unequal real solutions.
2. If, $b^2 - 4ac = 0$ there is a repeated solution, a root of multiplicity 2.
3. If, $b^2 - 4ac < 0$ there is no real solution.

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

Circle

$$A = \pi r^2$$

$$C = 2\pi r$$

Triangle

$$A = \frac{1}{2}bh$$

Rectangle

$$A = lw$$

$$P = 2l + 2w$$

Rectangular Box

$$V = lwh$$

$$S = 2lw + 2lh + 2wh$$

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

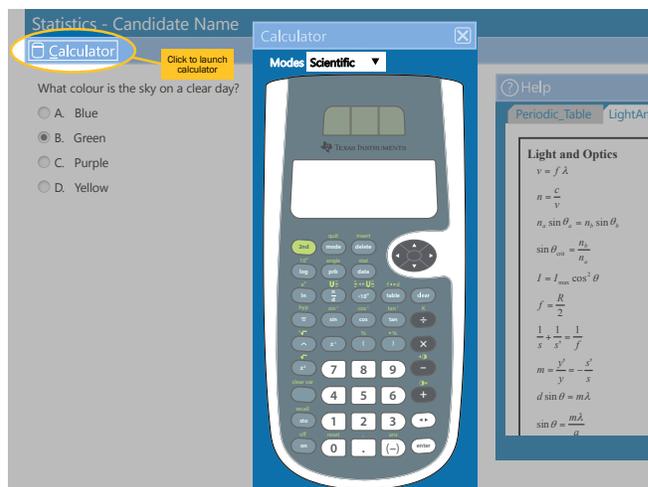
You also will receive a small, erasable whiteboard if you need one.

Whiteboards

Examinees cannot bring scratch paper to the exam. Instead, one will be provided for you to write notes or calculations on: a small whiteboard if you are testing at a Pearson Testing Center, and an on-screen “whiteboard” if you are testing online. You can see what the [on-screen “whiteboard”](#) looks like, and even try it out.

Calculator

You may not take your own calculator, if the exam calls for it. One will be provided on the testing screen. See example below.



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. The examination may be used to help fulfill the course requirement for the BS in General Business or as a free elective for all Excelsior College degree programs that allow for free electives. 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.

Precalculus Algebra Exam Development Committee

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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."



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