



Independent Study | in Idaho

MATH 143
College Algebra

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Course Guide

Independent
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Math 143 College Algebra

University of Idaho
3 Semester-Hour Credits

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3-Math 143 College Algebra

3 Semester-Hour Credits: U of I

Welcome!

Whether you are a new or returning student, welcome to the Independent Study in Idaho (ISI) program. Below, you will find information pertinent to your course including the course description, course materials, course objectives, as well as information about assignments, exams, and grading. If you have any questions or concerns, please contact the ISI office for clarification before beginning your course.

Policies and Procedures

Refer to the ISI website at www.uidaho.edu/isi and select *Students* for the most current policies and procedures, including information on setting up accounts, student confidentiality, exams, proctors, transcripts, course exchanges, refunds, academic integrity, library resources, and disability support and other services.

Course Description

Algebraic, exponential, logarithmic functions; graphs of conics; zeros of polynomials; systems of equations, induction. Prerequisite: sufficient score on SAT, ACT, or math placement test; or Math 108 with grade of C or better. It is recommended that Math 143 be taken within two years of passing Math 108 or its equivalent.

Required test scores can be found here: <http://www.uidaho.edu/registrar/registration/placement>.

UI students: Carries no credit after Math 160 or Math 170; carries 2 credits after Math 137 [Algebra with Applications]; general education credit - Mathematics; Polya Math Center unavailable for ISI students.

16 graded assignments, 4 proctored exams

Be advised, exams for this course are sent one-at-a-time once appropriate lessons have been graded.

Students may submit up to 2 assignments per week. Before taking exams, students MUST wait for grades and feedback on assignments, which may take up to two weeks after date of receipt by the instructor.

ALL assignments and exams must be submitted to receive a final grade for the course.

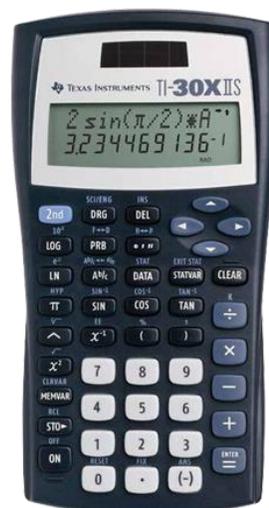
Course Materials

Required Course Materials

- Stewart, James, Lothar Redlin, and Saleem Watson. *Precalculus: Mathematics for Calculus*. 5th ed. Belmont, CA: Thomson Brooks/Cole, 2006. ISBN-10: 0-534-49277-0. ISBN-13: 978-0534492779
- Texas Instrument TI-30X IIS 2-Line Scientific Calculator ONLY.** No other calculators allowed for test-taking (see image to right).

Recommended Course Materials

- Stewart, James, Lothar Redlin, and Saleem Watson. *Student Solutions Manual for Stewart/Redlin/Watson's Precalculus: Mathematics for Calculus*. 5th ed. Belmont, CA: Thomson Brooks/Cole, 2006. ISBN-10: 0-534-49290-8. ISBN-13: 978-0534492908



Course Delivery

All ISI courses are delivered through Canvas, an online management system that hosts the course lessons and assignments and other items that are essential to the course. Upon registration, the student will receive a *Registration Confirmation* Email with information on how to access ISI courses online.

Course Introduction

The course has been divided into 16 lessons and four exams. Submit all lessons and exams for grading. Omit any chapters or sections not included in the assignments. You must wait for the graded assignments to be returned before taking the exams.

If you want more problems to solve to make sure you understand the material, there are several books available that have problems and solutions. *Schaum's Outline Series of College Algebra* is a good one and is available from the University of Idaho Bookstore.

Each of the lessons covered in this study guide is constructed with reading assignments in the text and practice problems. These alternate so that you read a selection and then work applicable practice problems. At the end of the lesson, there is a graded assignment section with a list of problems from the textbook, which you will submit for grading. These questions will cover a sample of the material. It is not possible to cover all of the material for each lesson in each graded assignment; therefore, the practice problems are very important. The grade on each assignment will be based on the work shown, as well as on the accuracy of the answer.

It is important that you understand the material presented before trying the graded assignments. Work through the examples in the reading assignments and the associated practice problems. The answers to all odd-numbered problems are located in the back of the textbook. If your answer differs from that in the back of the book, carefully check for errors and, if necessary, work the problem again. You will find that you usually need to write out more steps than the author does in the examples. The author sometimes skips steps in order to keep the number of pages to a minimum. Any section of the text not specifically mentioned in the lessons should be skipped (for example, Section 1.9 will be skipped, but Sections 1.8 and 1.10 will be covered).

There is a summary of important ideas, formulas, and rules for each lesson in the study guide. If you find a formula in the text that is not mentioned in the study guide, you do not need to memorize that formula for the exams.

Complete the graded assignments in **pencil only**. Copy the original question, show your work in a vertical format on the page, and circle the answer. Neatness and completeness are essential. You may use a non-text calculator on both assignments and exams, but very few problems will need them. Keep in mind that we are grading and testing your understanding of the material, not your ability to push buttons. Therefore, it is in your best interest not to rely on calculators while doing the assignments. Nevertheless, you *will* need a calculator for the sections on exponentials and logarithms.

Your instructor wishes you success in your study of pre-calculus and hopes that your experience with the course is both profitable and enjoyable.

Lessons

Each lesson includes the following components:

- Reading assignments
- Lesson objectives
- Practice problems
- Graded assignment

Study Hints

- Keep a copy of every lesson submitted.
- Complete all assigned readings.
- Set a schedule allowing for completion of the course one month prior to your desired deadline.
(An Assignment Submission Log is provided for this purpose.)

Exams

- Submit all lessons preceding each exam prior to taking it. For each exam, you must wait until the lessons preceding the exam have been returned to you graded, with feedback, before taking the exam.
- For your instructor's exam guidelines, refer to the letters sent in your registration packet and the *Exam Information* sections in this study guide.

The timing of the exams follows:

- Exam 1 (Sections 1.5-2.2): follows Lesson 4.
- Exam 2 (Sections 2.3-3.2): follows Lesson 8.
- Exam 3 (Sections 3.3-4.4): follows Lesson 12.
- Final Exam (Sections 1.5–10.4): follows Lesson 16.

The first three exams will be 70 minutes long and will cover only the material studied since the previous exam. The exams will be made up of problems similar to the assigned problems (both practice problems and graded problems).

The final exam will be similar to the first three exams except that it will be two hours long and will cover the entire course. That is, it will cover all assigned sections, from 1.5 through 10.4.

See *Grading* for specific information on exams, points, and percentages.

Proctor Selection/Scheduling Exams

All exams require a proctor.

To submit your *Proctor Information Form* online, visit the ISI website and select *Forms, Proctor Information Form*. Submit this form at least two weeks before your first exam. Refer to *About ISI Policies* on the ISI website for information on acceptable and unacceptable proctors.

Grading

The course grade will be based upon the following considerations:

The grading for this course will be based on 1,300 points, broken down as follows:

Graded Assignments	300 points (20 points each, lowest assignment dropped)
Exams	600 points (200 points each)
Final Exam	400 points

A letter grade is assigned only at the end of the course, as follows:

A = 1170 – 1300 D = 780 – 909

B = 1040 – 1169 F = 0 – 779

C = 910 – 1039

The final course grade is issued after **all** lessons and exams have been graded.

Acts of academic dishonesty, including cheating or plagiarism are considered a very serious transgression and may result in a grade of F for the course.

Contacting Your Instructor

Instructor contact information is posted in the *Course Rules* document on your Canvas site

Assignment Submission Log

Lesson	Section	Graded Assignment	Date Submitted
1	1.5	exercises 4, 14, 44, 50, 70, 80, 82, 90, 96, 100	
2	1.6 1.7	exercises 20, 40, 60, 70 exercises 16, 38, 58, 68, 74, 98	
3	1.8 1.10	exercises 8, 44, 60, 88, 92 exercises 20, 28, 34, 46, 72	
4	2.1 2.2	exercises 4, 16, 24, 36, 52 exercises 24, 34 (sketch by hand), 50, 60, 66	
It is time to make arrangements with your proctor to take Exam 1.			
5	2.3 2.4	exercises 2, 4, 16, 34 exercises 18, 32, 40, 64, 66, 68	
6	2.5 2.6	exercises 10, 28, 36, 40, 64 exercises 2, 10, 20, 24, 26	
7	2.7 2.8	exercises 4, 22, 26, 40, 46 exercises 8, 20, 28, 38, 54	
8	3.1 3.2	exercises 2, 10, 16, 26, 30 exercises 22, 36, 50, 56, 62	
It is time to make arrangements with your proctor to take Exam 2.			
9	3.3	exercises 12, 36, 40, 44, 50, 56, 58, 60, 66, 74	
10	3.4 3.5	exercises 10, 34, 54, 58, 66 exercises 8, 20, 40, 52, 60	
11	4.1 4.2	exercises 16, 30, 66, 78, 80 exercises 14, 32, 40, 54, 62	
12	4.3 4.4	exercises 6, 28, 42, 56 exercises 10, 22, 32, 42, 50, 68	
It is time to make arrangements with your proctor to take Exam 3.			

13	4.5	exercises 2, 6, 8, 10, 12, 14, 18, 20, 22, 24	
14	9.2 9.3	exercises 10, 18, 22, 26, 46, 48, 52, 56 exercises 16, 18	
15	10.1 10.2	exercises 12, 16, 32, 36, 40 exercises 14, 18, 24, 30, 38	
16	10.3 10.4	exercises 8, 12, 20, 28, 38 exercises 2, 8, 14, 16, 20	
It is time to make arrangements with your proctor to take the Final Exam.			

Lesson 1

Equations

Reading Assignments

Section 1.5

Lesson Objectives

Note: This is a good time to become familiar with the layout of the textbook. Each new section in the text has introductory material that the student should read very carefully. You will notice that the important words or topics will be in **boldface**. For example, on page 44 the words **equivalent equations** appear in bold type and are defined as two equations with exactly the same solution. You should be certain that you understand the meaning of all boldface words.

The items found in the blue boxes are another important feature of this textbook. Concepts found in the blue boxes are very important and should be written down by the student. For example, on page 49 you will find one of the most important formulas in all mathematics, the **Quadratic Formula**.

THE QUADRATIC FORMULA
<p>The roots of the quadratic equation $ax^2 + bx + c = 0$, where $a \neq 0$, are</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$

The examples are probably the most important aspect of each section. Each section contains several worked examples that are very similar to your homework problems. You should work through the examples very carefully and refer to them while doing your homework. Follow the directions in the lesson and then work odd-numbered practice problems related to the reading material. All odd-numbered problems have solutions in the back of the book.

Objectives for Section 1.5

- Know how to solve a linear equation $ax + b = 0$.

Example: $5x - 23 = 7x + 12$
 $-23 - 12 = 7x - 5x$
 $-35 = 2x$
 $\frac{-35}{2} = x$

- Know that to solve an equation you can do the following:
 1. Add or subtract the same quantity from both sides.
 2. Multiply or divide both sides by the same nonzero quantity.

Note: The example $5x - 23 = 7x + 12$, given above, uses both 1 and 2.

3. Raise both sides of an equation to the same power. Examples are given on the next page.

- Know the definition of the **Quadratic Equation**.

$$ax^2 + bx + c = 0, \text{ where } a, b, \text{ and } c \text{ are real and } a \neq 0$$

- Know the **Zero-Product Property**.
- Be able to factor a quadratic or trinomial expression or equation. (See Section 1.3, pages 27–31, for a review of factoring.)

Examples: $x^2 - 3x - 28 = (x - 7)(x + 4)$

$$6x^2 + x - 12 = (2x + 3)(3x - 4)$$

- Be able to solve a simple quadratic equation by extracting square roots.
Note: You should use this method when $b = 0$.

Example: $2x^2 - 32 = 0$
 $2x^2 = 32$
 $x^2 = 16$
 $x = \pm 4$

- Be able to solve a quadratic equation by completing the square.

Example: $x^2 + 6x - 4 = 0$
 $x^2 + 6x = 4$ Add 4 to both sides.
 $x^2 + 6x + 9 = 13$ Add $\left(\frac{6}{2}\right)^2 = 9$ to both sides.
 $(x + 3)^2 = 13$ Factor.
 $x + 3 = \pm\sqrt{13}$ Take square roots of both sides.
 $x = -3 \pm \sqrt{13}$ Subtract 3 from both sides.

- Know the Quadratic Formula and how to use it.

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

- Be able to determine the types of solutions of a quadratic equation by checking the discriminant $b^2 - 4ac$.

1. If $b^2 - 4ac > 0$, then there are two distinct real solutions.

Example:
 $16x^2 + 8x - 3 = 0$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(16)(-3)}}{2(16)} = \frac{-8 \pm \sqrt{256}}{32} = \frac{-8 \pm 16}{32}$$

$$x = \frac{-8 + 16}{32} \text{ or } x = \frac{-8 - 16}{32}$$

$$x = \frac{1}{4} \text{ or } x = -\frac{3}{4}$$

2. If $b^2 - 4ac = 0$, then there is exactly one real solution.

Example:

$$4x^2 - 4x + 1 = 0$$

$$x = \frac{4 \pm \sqrt{(-4)^2 - 4(4)(1)}}{2(4)} = \frac{4 \pm \sqrt{16-16}}{8} = \frac{4 \pm \sqrt{0}}{8}$$

$$x = \frac{4}{8} = \frac{1}{2}$$

3. If $b^2 - 4ac < 0$, then there are no real solutions.

Example:

$$3x^2 + 6x + 5 = 0$$

$$x = \frac{-6 \pm \sqrt{6^2 - 4(3)(5)}}{2(3)} = \frac{-6 \pm \sqrt{-24}}{6} = \frac{-6 \pm i\sqrt{24}}{6} = \frac{-6 \pm 2i\sqrt{6}}{6} = \frac{-3 \pm i\sqrt{6}}{3}$$

Here the solutions are complex numbers. Those will be covered in Lesson 10, Section 3.4.

- Be able to solve certain types of nonlinear or nonquadratic equations:

Example: $x^6 - 64 = 0$

Let $w = x^3$

Try substitution.

$$w^2 = (x^3)^2 = x^6$$

$$w^2 - 64 = 0$$

$$(w - 8)(w + 8) = 0$$

Factor by difference of squares. (See Section 1.3.)

$$w = 8 \text{ or } w = -8$$

$$x^3 = 8 \text{ or } x^3 = -8$$

Substitute back.

$$\sqrt[3]{x^3} = \sqrt[3]{8} \text{ or } \sqrt[3]{x^3} = \sqrt[3]{-8}$$

$$= \sqrt[3]{8} \text{ or } \sqrt[3]{x^3} = \sqrt[3]{-8}$$

Take
cube
roots
of both
sides.

$$x = 2 \text{ or } x = -2$$

Example: $9x^{2/3} + 24x^{1/3} + 16 = 0$
 $9(x^{1/3})^2 + 24(x^{1/3}) + 16 = 0$ Let $w = x^{1/3}$.
 $9w^2 + 24w + 16 = 0$ Substitute.
 $(3w + 4)(3w + 4) = 0$ Factor.

$$w = -\frac{4}{3}$$

$$x^{\frac{1}{3}} = -\frac{4}{3}$$

Substitute back.

$$\left(x^{\frac{1}{3}}\right)^3 = \left(-\frac{4}{3}\right)^3$$

Cube both sides.

$$x = -\frac{64}{27}$$

Example: $x^3 + 2x^2 - 3x - 6 = 0$

$$(x^3 + 2x^2) + (-3x - 6) = 0$$

Group.

$$x^2(x + 2) - 3(x + 2) = 0$$

$$(x^2 - 3)(x + 2) = 0$$

Factor by grouping.

$$(x + \sqrt{3})(x - \sqrt{3})(x + 2) = 0$$

Use the difference of squares with $x^2 - (\sqrt{3})^2$.

$$x = -\sqrt{3}, x = \sqrt{3}, x = -2$$

- For equations involving radicals or fractional powers, you may need to raise both sides to the same power. Always isolate the radical first.

Example: $\sqrt{5-x} - 3 = 0$

$$\sqrt{5-x} = 3$$

Isolate the radical.

$$(\sqrt{5-x})^2 = 3^2$$

Square both sides.

$$5-x = 9$$

Solve for x .

$$x = -4$$

Example: $\sqrt{x} - \sqrt{x-5} = 1$

There are two radicals that must be isolated in steps.

$$\sqrt{x} = \sqrt{x-5} + 1$$

$$(\sqrt{x})^2 = (\sqrt{x-5} + 1)^2$$

Square both sides.

$$x = x - 5 + 2\sqrt{x-5} + 1$$

Isolate the final radical.

$$4 = 2\sqrt{x-5}$$

$$4^2 = (2\sqrt{x-5})^2$$

Square both sides.

$$16 = 4(x-5)$$

Solve for x .

$$16 = 4x - 20$$

$$36 = 4x$$

$$x = 9$$

Note: See the third and fourth step above. $(\sqrt{x-5} + 1)^2 = (\sqrt{x-5} + 1)(\sqrt{x-5} + 1)$.

The FOIL process results in $2\sqrt{x-5} + 6$.

- Know that a solution which does not satisfy the original equation is called an **extraneous solution**. (See Examples 11 and 13 on pages 53–54, and the following example.) Always check for extraneous solutions.

Example: $3x(x-1)^{1/2} + 2(x-1)^{3/2} = 0$
 $(x-1)^{1/2}(3x + 2(x-1)) = 0$ Factor out $(x-1)^{1/2}$.
 $(x-1)^{1/2}(5x-2) = 0$ Simplify.
 $x = 1$ or $x = \frac{2}{5}$

However, $x = \frac{2}{5}$ leads to taking the square root of a negative number when you plug it

back into the original equation. Therefore, the only solution is $x = 1$.

- Know how to solve absolute value equations. (See Example 14 on page 54.) Be sure to note that the absolute value equations you work with in this section will generally have two answers.

Recall that $|a| = \begin{cases} a & \text{if } a \geq 0 \\ -a & \text{if } a < 0 \end{cases}$

Practice Problems

You will NOT turn these in.

Section 1.5

- Read page 44 through Example 1 on page 45.
 - Work page 55, exercises 1, 3, 9, 11, 15.
- Read from page 46, “Quadratic Equations,” through Example 6.
 - Work page 55, exercises 25, 27, 37, 43, 45, 47, 49.
- Read from page 49, the box about the Quadratic Formula, through Example 8.
 - Work page 55, exercises 59, 67, 69, 73.
- Read Example 9.
 - Work page 56, exercise 101.
- Read from page 52, “Other Equations,” through the paragraph following Example 11.
 - Work page 56, exercise 81.
- Read from page 53, the paragraph preceding Example 12, through Example 13.
 - Work page 56, exercises 87, 89, 91.
- Read Example 14.
 - Work page 56, exercises 95, 97.

Now you are ready to complete and turn in the graded assignment.

Graded Assignment

Section 1.5, pages 55–56, exercises 4, 14, 44, 50, 70, 80, 82, 90, 96, 100.