TABLE OF CONTENTS

INTRODUCTION

Dear Faculty:

The Rockswold/Krieger book team at Pearson Addison-Wesley is very excited that you will be using *Intermediate Algebra with Applications and Visualization*, Third Edition. We know that whether you are teaching this course for the first time or the tenth time, you will face many challenges, including how to prepare for class, how to make the most effective use of your class time, how to present the material to your students in a manner that will make sense to them, how best to assess your students, and the list goes on.

This manual is designed to make your job easier. Inside these pages are words of advice from experienced instructors, general and content-specific teaching tips, a list of the topics covered within the *Intermediate Algebra with Applications and Visualization* text, descriptions of both student and instructor supplements that accompany this text, and a list of valuable resources provided by your fellow instructors.

We would like to thank the following professors for sharing their advice and teaching tips. This manual would not be what it is without their valuable contribution.

William P. Fox, *Francis Marion University*

Debbie Garrison, *Valencia Community College*

Jolene Rhodes, *Valencia Community College*

Dr. C.B. Gubitose, *Southern Connecticut State University*

Marilyn Prine, *Tomball College*

It is also important to know that you have a very valuable resource available to you in your Pearson Addison-Wesley sales representative. If you do not know your representative, you can locate him/her by logging on www.aw-bc.com/replocator and typing in your zip code. Please feel free to contact your representative if you have any questions relating to our text or if you need additional supplements.

We know that teaching this course can be challenging. We hope that this and the other resources we have provided will help to minimize the amount of time it takes you to meet those challenges.

Good luck in your endeavors!

The Rockswold/Krieger book team

GENERAL, FIRST-TIME ADVICE

We asked the contributing professors for words of advice to instructors who are teaching this course for the first time or for the first time in a long while. Their responses can be found on the following pages.

Debbie Garrison, *Valencia Community College*

1. This textbook stresses the rule of 4 (algebraic solutions, numerical solutions, graphical solutions, and writing about problems). Make sure that you use all these techniques in your explanations and examples. It is not necessary to do every problem all different ways, but try to vary your approach so students see all methods every class or at least every week. Do some problems using more than one approach.
2. Connections between algebraic, numerical and graphical solutions should be emphasized. Show the students how the answer they get using algebra and the entries in the table are related. Show them where the algebraic solution corresponds to the point(s) on a graph.
3. Model for your students the correct interpretation of all solutions. Require them to answer problems with complete sentences.
4. Don't be afraid to use examples with "messy numbers." Use fractions, decimals, and negative numbers as coefficients. If every example you do in class turns out to have whole number answers, students will think they have done something wrong when their homework answers are not whole numbers.
5. Try to do problems other than the text examples in class; that way, the students will have the examples in the textbook as another source of problems to model.
6. If students are using a graphing calculator in this class, model its use and show them the keystrokes as you go. I always set up my overhead calculator prior to every class and use it as I suspect a student would to solve the problem. I teach keystrokes the first time I use a key or operation and just call out the keystrokes as I use them from then on. Discussions about order of operations and alternative methods of solution can be introduced once the basics are mastered. I try to only show one or two new calculator operations per class. This way the students are not overwhelmed by the technology and can concentrate on the problem solving.
7. This text emphasizes applications and modeling. Do application problems in class and assign them for homework. If you only do and assign the skill and drill problems, you are defeating the purpose and strength of this text.
8. Try to model correct mathematical terminology and notation in class. Students will mimic what you do in solving problems. If you are careless with notation, skip steps, neglect to define variables, or fail to interpret answers, so will they.
9. Have fun, use interesting examples, and show your enthusiasm for mathematics. Enjoyment of the topic can be contagious.

William P. Fox, *Francis Marion University*

This advice is from both a department chair and an instructor of the course. Make sure you know your department's expectations for students completing this course. Make sure you know whether graphing calculators are allowed in the follow-on courses before you make it available in your course.

Most students are placed in an intermediate algebra course because of their placement scores. There had to have been some disconnection between the student's high school algebra I and II and their ability to retain enough critical knowledge to move past a course such as this. A college teacher should not just stand at the board and work examples from the book, assign homework from the book, and test that same material. A college teacher motivates the learning of the material and facilitates students to comprehend and make solid connections with the material. Use the rule of four (symbolic, graphical, numerical, and interpret the results) often. Have the students work problems in class and maybe even have them work some at the boards. If you work all

the problems, the only thing you know for sure is that you can solve the problems. We want the student to be able to solve the problems.

Personally, I do not spend a lot of time on basic factoring skills. These were learned in high school and forgotten. The skill will not mysteriously reappear after our 1–3 lessons. Rather, I cover the purpose of factors and the result of factoring, graphical techniques, and the quadratic formula (for all quadratic equations—because it always works in both real and complex situations). Basic factoring works for simple integers and gets more difficult for students as problems increase in difficulty. Teach the quadratic formula and then "back" into the Fundamental Theorem of Algebra. I have found this works.

I have come to realize that in mathematics our use of symbols and "names" often confuses students. For example, consider the "Distance" formula. Students might remember this as either $D = RT$ or $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. Students coming from high school have been trained *not* to read the mathematics textbooks from grades K–12. We must break this habit. Ensure that the students have pre-read the material and tried a few basic problems prior to your lecture. Grade them daily on basic topics from the reading in an effort to break this trend. Make your class interactive, if possible. Use technology to allow students to discover concepts and connections rather than you just telling them a sequence of facts.

As a college mathematics teacher, you must know how this course integrates into the curriculum and whether it counts for General Education credits. Teach the course from the aspect of the gaining instructor. Emphasize the critical material over the mundane. Do not teach this course as if everyone will become a mathematics major. It is true that less than 1% of all college students move into mathematics. Teach it from the standpoint of usefulness to the curriculum and the usefulness of mathematics in the 21st century.

Not everything written in a textbook is critical information that has to be taught. Textbooks are written generally enough to allow flexibility. Use this flexibility.

Include modeling applications (or real world applications) to motivate the material. This answers the question, "Why am I learning this?" before it is asked. I start every chapter and many sections with a motivating problem and then spend the time covering the material that allows for the solution.

Allow students time to experiment, conjecture, and discover. Too often we like to "show and tell" and we would be more robust educators if we allow students time to discover some things on their own.

Jolene Rhodes, *Valencia Community College*

1. Make your expectations clear to the students. For example, if application problems are important, then they need to be discussed in class and assigned for homework as often as possible.
2. If this is the first course where students are required to use a graphing calculator, be sure to take one to class and explain the keystrokes needed for new types of calculations. It is not easy to learn by reading the instruction manual that comes with the calculator.
3. Sometimes a class of students will not keep to a schedule that you designed before the course starts. They may need an extra day for some topics and less time for others. Be a little flexible but don't get so far behind that you cannot finish the material.
4. It is important to stress solving graphically, numerically, and symbolically throughout the course. Students should understand the connections and be capable of using one method of solution to check answers they found using a different method. Some students will prefer using one method and you need to decide if you want them to choose a method or you want to specify which method they should use when you are testing the material.

Marilyn Prine, *Tomball College*

When considering pacing for the course, expect to spend extra time on Chapter 6. Students find this chapter the most difficult.

As you move through the chapters, try to make as many connections to past and future chapters as possible. For example:

Extraneous solutions in Chapter 6 and 7

Inverse vocabulary in Chapter 1, 6, and 9

"Isolate the absolute value" in 3.5 and "Isolate the radical" in 7.5

Reading function values from graphs in Sec 2.1, 2.2, 5.1, 6.1, 8.1

Make sure students are successful factoring in Chapter 5 since factoring is used heavily in Chapter 6 and some in Chapter 8.

SAMPLE SYLLABI

Provided by:

Francis Marion University
Valencia Community College

MATH 105, COLLEGE ALGEBRA I WITH ANALYTIC GEOMETRY SYLLABUS

Instructor:	Dr. William Fox
Office:	
Phone:	
Office Hours:	MW 1:30–3:00 TTh 9:00–11:30, 2:10–3:00 Other times by appointment.
Text:	*Intermediate Algebra with Applications and Visualization*, Rockswold/Krieger, AW
Additional Resources:	The instructor is available during office hours and at other times (by appointment) to provide extra assistance with the course material. Please take advantage of this resource. Computer tutorials and instructional videos are available as a supplement to the text. These would be excellent extra resources to assist in mastering the materials presented in class and in the text book. See the instructor for information on how to access these materials. Tutors in all subject areas are available in the afternoons in the University Center. These tutors are available to you free of charge. For a list of paid, private tutors, see your instructor or the math secretary.
Calculator Objectives:	Graphing calculator will be allowed after Test 1. The goals of this course are to have the student 1. Be able to compute with integers additional numbers, locate such numbers on the real number line, identify numbers as whole, integer, rational or irrational, and answer relative conceptual questions. 2. Learn to compute using the order of operations, evaluate certain roots, simplify exponential expressions, use the field properties, and answer conceptual questions. 3. Be able to combine like terms, solve linear equations and inequalities in one variable (graphing the solution sets of the latter), and demonstrate skill in modeling mathematically. 4. Be able to solve and graph solution sets of compound linear equations and inequalities in one variable, solve linear inequalities involving absolute value, and model inequalities. 5. Be able to graph lines and linear inequalities in two variables, derive the equations of lines given certain characteristics, identify functions and relations and their domains, and solve variation problems. 6. Be able to solve systems of linear equations in two variables graphically and algebraically, be able to solve systems of linear equations in three variables, and be able to model in two variables.
Requirements:	1. Regular attendance is required. **The instructor reserves the right to withdraw any student who is absent from more that 6 class meetings.** It is the student's responsibility to get a copy of the class notes and the homework assignment for any days missed. 2. Students are responsible for completing assigned problems as we complete each section. Assignments are given by section in Appendix A of the syllabus. Additionally, students are responsible for reading ahead to the next section of the text. Approximately once a week there will be a 10–15 minute announced quiz on the

homework materials or a separate homework assignment to be submitted for a grade. Homework/Quiz grades will account for 15% of the final grade. Students will not be allowed to make up missed quizzes or homework, but a couple of the grades will be dropped at the end of the semester.

3. There will be 4 chapter tests given, the tentative dates of which are given in the attached schedule (any change to these dates will be announced at least a week in advance of the new date). Students should be present for all tests. Make-ups for missed tests will be permitted only in the case of verifiable medical emergency. If you know in advance, however, that you have a conflict with a test date, you should discuss with your instructor the possibility of taking the test **early**. Each test will account for 15% of the final grade.

4. There will be a **comprehensive final exam** given at the date and time listed on the attached schedule. All students **must be present** for the exam to receive credit for the course. If a student has more than 2 exams scheduled for one day, the student may request permission from the instructor to take the exam at an alternate date/time. Such arrangements must be made by Reading Day. Any other absences from the final exam will result in a grade of F for the course unless approved in writing by the Provost. The final exam will account for 25% of the final grade.

Summary of Grading Procedure:

Composition of Final Grade:		**Grading Scale:**	
Weekly grades	15%	90–100	A
Test 1	15%	85–89	B+
Test 2	15%	80–84	B
Test 3	15%	75–79	C+
Test 4	15%	70–74	C
Final Exam	25%	65–69	D+
		60–64	D
		Below 60	F

Please note that you must earn a grade of C or better to proceed to Math 111

Important Dates:

September 7 (Labor Day)	Classes will meet
September 25	Last day to withdraw without penalty*
October 14	Midterm
November 3 & 4	Fall Break (no classes)
November 20	Last day to withdraw with possible penalty
November 26 & 27	Thanksgiving Break (break begins at 12:30 pm on Wednesday, November 25)
December 7	Last day of classes
December 8	Reading Day
December 9	Exams begin

*Please be aware that withdrawals after September 25 will be issued with a grade of either passing or failing depending upon your average at that time. If you receive a W/F (withdraw/failing) grade, it does affect your GPA. Withdrawals on or before September 25 will be issued a grade of W, which does not affect your GPA. You should also consider the number of credit hours you are carrying before making the decision to withdraw. If you drop below 12 credit hours, you may no longer be considered a full-time student. This may affect your financial aid and your health insurance if you are insured by your parents.

Tentative Schedule:

8/28	Intro and Section 1.1
8/31	1.1
9/2	1.2
9/4	1.3
9/7	1.4
9/9	1.4
9/11	1.5
9/14	Review for Test 1
9/16	Test 1 NO CALCULATORS
9/18	2.1
9/21	2.1 and 2.2
9/23	2.2
9/25	2.3
9/28	2.3
9/30	2.4
10/2	2.4
10/5	Review for Test 2
10/7	Test 2
10/9	3.1
10/12	3.1
10/14	3.2
10/16	3.2
10/19	3.3
10/21	3.3
10/23	3.4
10/26	3.4
10/28	Review for Test 3
10/30	Test 3
11/2	Fall Break – No Class
11/4	4.1
11/6	4.1
11/9	4.2
11/11	4.2
11/13	4.2
11/16	4.3
11/18	4.4
11/20	4.4
11/23	4.5
11/25	4.5
11/30	Review for Test 4
12/2	Test 4 NO CALCULATORS
12/4	Project: Chemical Balancing
12/7	Review for Final Exam

MATH 111 – INTERMEDIATE ALGEBRA

Dr. William P. Fox, Chairman and Professor
Office #
Office Phone #
Office Hours: TBD
E-mail

Text: *Intermediate Algebra with Applications and Visualization*, Rockswold/Krieger, AW

Goals: Students should be able to use algebra properties to solve real world problems. Students will learn to work in groups as well as use technology to assist in the solving of problems. Students will learn how to model and think critically with algebraic equations.

Topics: Review of Linear Functions and solving of Linear Equations
Polynomials: form, properties, factoring
Rational Expressions: properties, uses, and equations
Roots and Radicals: properties, uses, and equations
Quadratic Equations: 2nd order polynomials, quadratic formula

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

Graphs and formulas of Nonlinear Functions: Parabolas, Circles, Hyperbolas, and Ellipses
Exponential and Logarithmic Functions
Mathematical Models

Grading:		
	Portfolio	100 Points
	Quizzes: 4@50 Points	200 Points
	Projects: 3@200	600
	Major exams: 5@120	600
	Comprehensive Final	200 points (all students must take)
	Total	1700 points

Class Time: 08:30–09:20 MWF

Student Requirement: A specific graphing calculator is required and will help you throughout this course.

Attendance Policy: Any students who miss more than 6 classes will be dropped from the course.

Portfolio: This is a notebook that contains all critical definitions, old projects, quizzes, student essay and reflections, and study notes.

Grades:		
	90–100	A
	85–89.99	B+
	80–84.99	B
	75–79.99	C+
	70–74.99	C
	65–69.99	D+
	60–64.99	D
	<60	F

Homework: Homework will be assigned at the end of every class. Problems will be assigned that help in learning the material. Students may work together on all homework assignments. Study groups are encouraged. If you are having trouble, then come in for help. Don't wait until it is overwhelming. I will ask students to put homework up on the board.

Critical Thinking: Critical thinking is a concept that causes the student to blend together more than one skill to solve a problem. Critical thinking will be used in all math models and projects for this course.

Lesson #	Topic/Assignment	HW: (all TBD)
1	Review of Lines (review Sections 2.1–2.4)	
2–3	Review of Lines – Continued – Slope, point-slope, slope-intercept Proportionality as a linear equation (sections 2.1–2.4)	
4–5	Systems of linear equations review: (review 4.1, 4.2)	
6	Work on Project 1. Do lesson 7	
7	Read Section 2.1 (functions). Understanding functions is critical. Project 1 due	
Chapter 5 Polynomials		
8	Section 5.1 and 5.2	
9	Section 5.3	
10	Factoring, Section 5.4	
11	Why do we factor? Purposes and uses of the results	
12	Special Factoring, Section 5.5	
13	Section 8.4: The Quadratic Formula	
14	Using the graphing calculator appropriately	
15	Major Test 1	
Chapter 8		
16	Section 8.1 and 8.3	
17	Section 8.4	
18	QUADRATIC Connections Activity	
19	Major Test 2	
Chapter 7		
20	Radicals with Technology, Sections 7.1–7.5, Using Technology	
21	Radicals with Technology, Sections 7.1–7.5, Using Technology	
22	Section 7.6	
23	Section 7.6	
24	Major Test 3	
Chapter 6		
25	Section 6.1	
26	Section 6.2	
27	Section 6.2 and 6.3	
28	Section 6.6	
29	Section 6.7	
30	Review	
31	Major Test 4	
Chapter 10		
32	Section 10.1 Parabolas and Circles	
33	Section 10.1 Parabolas II – Motion Problems, Hand out project	
34	Section 10.2 Ellipses and Hyperbolas I	
35	Section 10.2 Ellipses and Hyperbolas II	
Chapter 9		
36	Inverse Functions	
37–38	Section 9.2 Exponential Functions	
38–39	Section 9.3 Log Functions	
39–40	Section 9.4 Properties	
40–41	Section 9.5 Applications and Models using exponential and log functions	
42	Major Test 5; Chapters 9	
43	Review for exam (Project due on exponential and log functions)	

MAT 1033C, INTERMEDIATE ALGEBRA

Course Syllabus

(SESSION 2)

Instructor: Mrs. Deborah Garrison

Office:

Phone:

E-Mail:

Office Hours:

COURSE DESCRIPTION

MAT 1033C Intermediate Algebra
3 credit hours, 4 contact hours

Prerequisite: MAT 0020C with a grade of "C" or better or MAT 0024C with a grade of C or better or an appropriate score on entry placement test. Intermediate Algebra presents algebraic skills, which are prerequisite for MAC 1105. Topics include linear equations and inequalities in two variables and their graphs, systems of linear equations and inequalities, introduction to functions, factoring, algebraic fractions, rational equations, radicals and rational exponents, complex numbers, quadratic equations, scientific notation, applications of the above topics, and the communication of mathematics. Applications emphasizing connections with other disciplines and the real world will be included. This course does not satisfy the Gordon Rule in mathematics but can be used to fulfill the general education requirement of the A.S. degree. A minimum grade of "C" is required to use this course as a prerequisite for later mathematics courses. (special fee)

VALENCIA CORE COMPETENCIES

Valencia desires their graduates to possess and demonstrate a set of global competencies including the ability to think, communicate, value, and act. In an effort to help you acquire and improve upon your ability to demonstrate these competencies, this course will include activities that require you to:

1. Think clearly, critically, and creatively.
2. Communicate with others in written and verbal form.
3. Make reasoned value judgments and responsible commitments.
4. Act purposefully, reflectively, and responsibly.

Due to the nature of these global competencies many problems and activities will be presented in the context of an application. These applications will require students to select appropriate information from the problem and communicate effectively how to arrive at an appropriate solution for the problem.

REQUIRED COURSE MATERIALS

Text: *Intermediate Algebra Through Modeling & Visualization* by Gary Rockswold

Calculator: A graphing calculator is required for this course (the instructor will be using a TI-83 plus for classroom demonstration)

Lab Manual: *Activities for Beginning and Intermediate Algebra* by Garrison, Jones, Rhodes

CLASS POLICIES

Attendance: Attendance is expected of all students except in case of an emergency. Attendance in lab is mandatory. If due to an emergency you must miss class or lab, it is your responsibility to find out what you missed either by contacting the instructor or another student.

Tardiness: Being late to class or leaving early is a disruption to the class and is discourteous to the professor and the other students. All students are expected to be on time to class and to stay for the entire class period.

Homework: Homework problems will be assigned for each section of the text. Students are expected to make an honest attempt to complete all assigned problems prior to the next class. It is recommended that you keep all homework neatly organized in a notebook.

Withdrawals: There is a withdrawal deadline for receiving the non-punitive grade of "W." After that deadline, if you withdraw, your average will determine whether you will receive a grade of "WP" (A-D) or a "WF" (F).

EVALUATION

Your grade for this course will be determined by grades on tests, lab work, worksheets, and a comprehensive final exam.

Tests: There will be 4 unit tests. Each will be taken in lab and will be announced in advance. I do not allow makeup exams so be sure to be present for all scheduled tests. One missed test may be replaced by your grade on the final exam.

Lab Work: You will receive a grade for your work in lab. Some of these may be group exercises. There will be no makeups. The lowest 10% of lab activities will be dropped before calculating your lab average to account for illness and emergencies.

Worksheets: Worksheets, quizzes and other class activities will count as one test. All assignments are due at the beginning of class. Late work will not be accepted and there are no makeups for missed quizzes. The lowest 10% of these grades will be dropped before calculating your average to account for illness and emergencies.

Final Exam: There will be a comprehensive final exam given at the end of the course during the final exam period.

Grade Calculation:

Unit Tests:	400 points
Lab Activities:	100 points
Worksheets:	100 points
Final Exam:	100 points

Your grade will be calculated by using the following:

90%–100%	"A"
80%–89%	"B"
70%–79%	"C"
60%–69%	"D"*
59% or less	"F"*

*These grades will require you to repeat MAT 1033 before continuing on in your mathematics courses.

LAB

Attendance in lab is mandatory.

ACADEMIC HONESTY

You are expected to do your own work on exams and other assignments. Providing information to another student or receiving information concerning exam content is considered cheating. The professor reserves the right to determine the appropriate penalties within Valencia Community College's academic honesty policies.

Disclaimer: Changes in the evaluation procedure may be made at the discretion of the instructor.

MAT 1033C, INTERMEDIATE ALGEBRA

Course Syllabus

Spring 2008

Instructor: Jolene Rhodes

Office: 2–109

Phone:

E-Mail:

Student Engagement Hours:

COURSE DESCRIPTION:

MAT 1033C — 3 credit hours
Intermediate Algebra — 4 contact hours

Prerequisite: MAT 0020C with a grade of "C" or better or MAT 0024C with a grade of C or better or an appropriate score on entry placement test. Topics include linear equations and inequalities in two variables and their graphs, systems of linear equations and inequalities, introduction to functions, factoring, algebraic fractions, rational equations, radicals and rational exponents, complex numbers, quadratic equations, scientific notation, applications of the above topics and the communication of mathematics. Applications emphasizing connections with other disciplines and the real world will be included. This course does not satisfy the Gordon Rule in mathematics but can be used to fulfill the general education requirement of the A.S. degree.

VALENCIA CORE COMPETENCIES:

This course reinforces the arithmetic and many of the algebra CLAST competencies, teaches several of the algebra CLAST competencies not taught in earlier courses and helps build the competencies expected of a Valencia graduate.

Valencia faculty have defined four interrelated competencies (Think, Value, Communicate, Act) that prepare students to succeed in the world community. These competencies are outlined in the College catalog. In this course, through classroom lecture and discussion, group work, and other learning activities, you will further develop your mastery of these core competencies. Due to the nature of these global competencies many problems and activities will be presented in the context of an application. These applications will require students to select appropriate information from the problem and communicate effectively how to arrive at an appropriate solution for the problem.

REQUIRED COURSE MATERIALS:

Text: *Intermediate Algebra with Applications and Visualization* by Rockswold and Krieger, 2nd edition, published by Pearson Education, Inc., 2005.

Calculator: A graphing calculator is required for this course. The TI-84 or TI-83 Plus is recommended. TI-89 or calculators with symbolic manipulators are not acceptable.

Lab Manual: *Activities for Beginning and Intermediate Algebra by Garrison*, Jones, and Rhodes, 2nd edition, published by Brooks–Cole, 2005.

Other: Graph paper is required for graphs throughout the course. A ruler is useful for drawing the axes for graphs as well as graphs of linear functions.

ACADEMIC SUPPORT CENTER:

A limited number of TI-83/TI-84 calculators are available for check out. Tutors are available on a drop-in basis. Personal tutors are also available upon request for a limited number of hours per week.

CLASS POLICIES:

Attendance: Attendance is expected of all students except in case of an emergency. Attendance in lab is mandatory. If due to an emergency you must miss class or lab, it is your responsibility to find out what you missed either by contacting the instructor or another student. A list of homework problems is available on my website.

Cell Phones and Other Disruptions: Students are expected to turn off cell phones at the start of class unless the instructor is notified of a possible emergency call. Being late to class or leaving early is a disruption to the class and is discourteous to the professor and the other students. All students are expected to be on time to class and to stay for the entire class period. Students are expected to behave in a manner that is conducive to learning both for themselves and others in the class. Students may be asked to leave if their behavior is deemed a disruption by the instructor.

Homework: Homework problems will be assigned for each section of the text. Students are expected to make an honest attempt to complete all assigned problems prior to the next class. It is recommended that you keep all homework neatly organized in a notebook.

Withdrawals: The withdrawal deadline for receiving a grade of "W" is March 14, 2008. After that deadline, if you withdraw, your average will determine whether you will receive a grade of "WP" (A-D) or a "WF" (F). Please contact your instructor if you think you may have earned a grade in Intermediate Algebra but will not finish this course. If you do not withdraw and do not take the final exam, you will receive a grade of F as per college policy.

EVALUATION:

Your grade for this course will be determined by grades on tests, lab work, worksheets/quizzes, and a comprehensive final exam.

Tests: There will be 4 unit tests. Each test will count as 100 points. Each test will be announced in advance. I do not allow makeup exams so be sure to be present for all scheduled tests. If you know you are going to miss an exam in advance, contact your instructor. The lowest (or a missed test grade) test grade may be replaced by the grade on the final exam.

Lab Work: You will receive a grade for your work in lab. Some of these may be group exercises. There will be no makeup assignments. The lowest 10% of lab activities will be dropped before calculating your lab average to account for illness and emergencies. This will count as 100 points towards your grade.

Worksheets: Worksheets, quizzes and other class activities will count as 100 points towards your grade. All assignments are due at the beginning of class. Worksheets may be handed in one day late for a maximum of half credit (unless reviewed in class). The lowest 10% of the grades will be dropped before calculating your average.

Final Exam: There will be a comprehensive final exam given at the end of the course during the final exam period. The final exam is on Tuesday, April 22 from 10am–12:30pm. The final exam is worth 100 points.

Grade Calculation:

Unit Tests: 400 points
Class Activities/Quizzes: 100 points
Lab Work: 100 points
Final Exam: 100 points

Your grade will be calculated by using the following:

90%–100%	"A"	80%–89%	"B"	70%–79%	"C"
60%–69%	"D"*	59% or less	"F"*		

*These grades will require you to repeat MAT 1033 before continuing on in your mathematics courses.

ACADEMIC HONESTY:

You are expected to do your own work on exams and other assignments. Providing information to another student or receiving information concerning exam content is considered cheating. The professor reserves the right to determine the appropriate penalties within Valencia Community College's academic honesty policies.

Tentative Homework List

1.1 (Review)	10	11, 15, 17, 21, 45, 57, 61, 65, 103 // Set 2:13, 23, 51, 59, 63
1.2 (Review)	20	3, 5, 7, 13, 17, 31, 35, 43, 51, 55, 57, 61, 67, 73, 79, 89, 107, 109 // Set 2: 15, 33, 45, 53, 65, 85, 111
1.3 (Review)	35	7, 11, 25, 27, 29, 33, 39, 45, 47, 51, 59, 65, 73, 89, 105, 109, 113, 121, 123, 127, 131, 133, 141 // Set 2: 43, 53, 57, 67, 81, 97, 103, 107, 111, 119, 129
1.4	45	13, 25, 29, 39, 43, 47, 51, 55, 57, 65, 59 // Set 2: 15, 27, 33, 41, 49, 59, 67
1.5	60	5, 9, 13, 17, 19, 23, 31, 37, 39, 47, 51, 55, 65 // Set 2: 7, 15, 21, 33, 41, 53, 57, 67 (no scatterplots on the calculator)
Review	67	1, 15, 19, 23, 25, 27, 31, 35, 37, 39, 43, 47, 53, 57, 61, 63, 65, 69, 73, 75, 76, 77, 83, 85, 87, 88, 91, 92
Chapter test	70	1, 3, 5, 7–12 all, 14–16
2.1	84	11, 14, 15, 21, 23, 25, 41, 45, 47, 49, 53, 59, 61, 67, 71, 75, 87, 89, 91, 97, 99
2.2	98	7, 13, 17, 21, 23, 27, 31, 35, 41, 43–46, 49, 55, 59, 63–66, 67, 71, 73, 77
2.3	111	3, 5, 9, 13, 23, 27, 31, 35, 37, 39, 47, 51, 53, 57–60, 63, 65, 71, 73, 75, 83
2.4	127	9, 11, 13–18, 21, 23, 25, 27, 33, 41, 43, 45, 49, 51, 55, 61, 63, 65, 73, 75, 79, 83, 93, 95
Review	136	3, 13, 15, 17, 18, 19, 21, 23, 27, 29, 33, 36, 43, 45, 49, 50, 51, 53, 54, 56, 57, 58, 61, 62, 63, 67, 68, 69, 73, 77, 81–86
Chapter test	141	1, 3, 5–14 all
3.1	154	6, 13, 17, 19,27, 29, 35, 43, 47, 49, 53, 55, 57, 59, 63, 67, 71, 73, 75, 77
3.2	164	5, 9, 13, 21, 29, 31, 35, 41, 43, 45, 49, 53, 57
3.3	175	9, 11, 15, 23, 25, 27, 35, 36, 39–49 odd, 55, 59, 61, 65, 73, 75, 77, 79, 80, 85
3.4	187	7, 11, 13, 17, 25, 27, 33, 39, 41, 47, 51, 59, 69, 73–83 odd, 91, 97
Review	205	1, 3, 4, 6, 9, 11, 12, 17, 23, 27, 29, 31, 33, 39, 41, 43, 45–49 all, 51, 57
Chapter test	210	1–11 all, 14
4.1	225	1, 5, 6, 7, 11, 13, 15, 19, 23, 31, 45, 47, 51, 59, 61, 62, 63, 65
4.2	237	1–6 all, 9, 11, 15, 17, 23, 31, 32, 33, 37, 41, 45, 49, 51, 59, 65, 67, 73, 77, 79, 81, 85, 87, 89
4.3	248	3, 5, 11, 17, 23, 31, 35, 43–46 all, 48, 49, 57, 59, 63
Review	293	1, 3, 4, 5, 6, 7, 9, 13, 17, 19, 23, 27, 30, 59, 63, 64
Chapter test	296	1–5 all, 7, 11–13

5.1	310	2, 6, 7, 11, 13, 19, 23, 25, 33, 37, 39, 43, 45, 49, 53, 57, 61, 63, 69, 79, 83, 85, 91, 101, 105, 107, 108, 109
5.2	322	9, 11, 19, 25, 35, 43, 45, 59, 65, 71, 79, 81, 85, 91, 99, 111, 115, 121
5.3	333	11, 17, 23, 27, 37, 43, 47, 51, 53, 57, 61, 65, 69, 75, 77, 81, 85, 93, 98, 101
5.4	344	5, 9, 11, 17, 21, 25, 29, 35, 37, 43, 53, 55, 69, 71, 73, 77, 79, 83, 87, 91, 93, 96
5.5	352	11, 15, 23, 27, 35, 39, 51, 55, 65, 71, 73, 77, 81 // Set 2: 85, 89, 93, 97, 101, 109, 111, 117
5.6	360	7, 11, 15, 17, 19, 25, 27, 37, 47, 49, 69, 71, 73
Review	366	5, 6, 9, 10, 13, 15, 17, 21, 23, 24, 26, 29, 31, 33, 37, 39, 41, 45, 49, 53, 55, 57, 63, 67, 69, 71, 73, 75, 79, 80, 90, 93, 101, 103, 107, 109, 110
Chapter test	370	1–16, 18–22
6.1	382	11, 13, 29, 35, 37, 39, 45, 49, 53, 59, 61, 65, 67–70 all, 71, 73, 75, 78
6.2	394	21, 25, 29, 33, 37, 39, 47, 55, 63, 65, 69, 73, 77, 81, 87, 91
6.3	405	21, 25, 27, 31, 33, 39, 43, 45, 51, 53, 59, 69
6.4	414	13, 15, 17, 19, 21, 25, 31, 35, 37, 41, 45, 49, 51, 53, 57, 63, 67, 73, 77, 83
6.5	422	7, 13, 17, 21, 27, 37, 39
6.6	433	11, 15, 17, 21, 23, 25, 57, 59
Review	451	4, 5, 8, 9, 11, 13, 15, 21, 22, 25, 33, 34, 38, 39, 43, 45, 47, 51, 52, 55, 59, 61, 63, 65, 68, 70, 89, 90, 91, 93, 94, 95, 96
Chapter test	455	2, 4–11, 17–19
7.1	469	6, 7, 9, 11, 13, 17, 21, 29, 33, 39, 41, 49, 55, 57, 59, 61, 63, 67, 73, 75, 79, 87, 91, 99, 101
7.2	478	11, 13, 17, 21, 23, 29, 31, 35, 37, 41, 57, 61, 63, 65, 71, 73, 75, 77, 83, 89, 95, 99, 103
7.3	486	17, 19, 25, 29, 31, 33, 37, 43, 47, 53, 57, 61, 77
7.4	497	9, 11, 25, 29, 31, 35, 39, 63, 65
7.6	518	3, 6, 7, 11, 15, 19, 21, 23, 25, 29, 31, 35, 37, 43, 51, 61, 63, 67
Review	523	3, 5, 7, 8, 11, 14, 15, 17, 20, 22, 23, 25, 27, 29, 31, 35, 38, 39, 41, 45, 47, 49, 55, 65, 69, 71, 73, 87–90 all, 95, 96, 99, 102
Chapter test	526	1–9 all, 11–16 all, 21–26 all
8.1	537	1, 2, 3, 5, 7, 8, 10, 11, 13, 15, 17, 21, 25, 29, 31, 35, 41, 47, 49, 53, 61, 63–67 all, 69, 71, 73, 75
8.2	549	1, 3, 7, 9, 13, 19, 21, 25, 27, 29, 31, 33, 37, 39, 55, 57
8.3	560	5, 6, 7, 9, 11, 17, 19, 21, 23, 25, 27, 31, 33, 37, 41, 43, 45, 49, 75, 77, 90, 92, 94, 95, 96, 97
8.4	572	3, 4, 7, 13, 15, 19, 29, 31, 35, 37, 43, 53, 67, 71, 79, 97
Review	590	1, 2, 3, 5, 9, 11, 13, 17, 19, 25, 27, 29, 31, 33, 39, 41, 43, 51, 55, 57, 57, 61, 63, 67, 84–87 all, 90
Chapter test	595	1–4 all, 6, 7, 11, 12, 17, 19

Disclaimer: Changes in the evaluation procedure may be made at the discretion of the instructor.

TEACHING TIPS CORRELATED TO TEXTBOOK SECTIONS

Following is a listing of the topics included in the Intermediate Algebra with Applications and Visualization, Third Edition *text, as well as specific teaching tips provided by the contributing professors.*

Chapter 1: Real Numbers and Algebra

SECTION TITLES AND TOPICS

1.1 Describing Data with Sets of Numbers
Natural and Whole Numbers ◆ Integers and Rational Numbers ◆ Real Numbers ◆ Properties of Real Numbers

1.2 Operations on Real Numbers
The Real Number Line ◆ Arithmetic Operations ◆ Data and Number Sense

1.3 Integer Exponents
Bases and Positive Exponents ◆ Zero and Negative Exponents ◆ Product, Quotient, and Power Rules ◆ Order of Operations ◆ Scientific Notation

1.4 Variables, Equations, and Formulas
Basic Concepts ◆ Modeling Data ◆ Square Roots and Cube Roots ◆ Tables and Calculators (Optional)

1.5 Introduction to Graphing
Relations ◆ The Cartesian Coordinate System ◆ Scatterplots and Line Graphs ◆ The Viewing Rectangle (Optional) ◆ Graphing with Calculators (Optional)

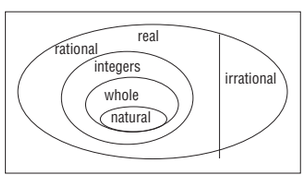
TEACHING TIPS

When planning your course, keep in mind that most of this chapter is probably a review for the students. Do not spend too much time on this chapter. If graphing calculators are to be used and are new to the students, stress how to do order of operations including exponents, how to make tables, and how to set a viewing window.

Jolene Rhodes,
Valencia Community College

Section 1.1

Students can sometimes see the relationship between sets of numbers better if they are shown using a Venn diagram.



Jolene Rhodes,
Valencia Community College

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To help remember the **Identity** Property, use the words "you get the "**Identical**" same number as the answer.

Marilyn Prine,
Tomball College

◆ ◆ ◆

Show that the distributive property can be written as $ab + ac = a(b + c)$ as well as $a(b + c) = ab + ac$. Then when factoring greatest common factors comes up in Chapter 5, you can refer to it as the distributive property again.

Marilyn Prine,
Tomball College

Section 1.2

This is a good section to emphasize that in math, the word "inverse" cannot be used alone. Distinguish between "additive inverse" (opposite), and "multiplicative inverse" (reciprocals). Mention that future lessons will discuss "inverse operations", "inverse functions" and "inverse variations."

Marilyn Prine,
Tomball College

Section 1.3

Show the students what scientific notation looks like on their calculators. If the calculator displays an answer in scientific notation later in the course, then they recognize and understand what the notation represents.

Jolene Rhodes,
Valencia Community College

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If the property $\frac{a^m}{a^n} = a^{m-n}$ property is introduced BEFORE the $a^0 = 1$ property, the illustration of $a^0 = 1$ would be: $\frac{a^3}{a^3} = a^{3-3} = a^0$, and since $\frac{a^3}{a^3} = 1$, then $a^0 = 1$. That also makes it clear why 0^0 is undefined (a cannot equal 0 because it would give 0 in the denominator)

Marilyn Prine,
Tomball College

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This section would be a good time to illustrate the difference between -2^2 and $(-2)^2$ and how it must be entered on the calculator correctly.

Marilyn Prine,
Tomball College

Section 1.4

It is important to stress making tables by hand, by the calculator, or both in this section if you are going to have students solve numerically throughout the course. Also, students should have practice using tables to see patterns so they can write equations.

Jolene Rhodes,
Valencia Community College

Section 1.5

Students sometimes have difficulty finding the domain and range from a graph. They get confused as to whether it should be a list of values (as for a scatterplot) or an interval of values (as for a continuous graph). Be sure to distinguish between these two ideas.

Jolene Rhodes,
Valencia Community College

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Spending time helping students understand the viewing window, xmin, xmax, xscl, ymin, ymax, and yscl, will save time throughout the course.

Marilyn Prine,
Tomball College

Chapter 2: Linear Functions and Models

SECTION TITLES AND TOPICS

2.1 Functions and Their Representations
Basic Concepts ◆ Representations of a Function ◆ Definition of a Function ◆ Identifying a Function ◆ Tables, Graphs and Calculators (Optional)

2.2 Linear Functions
Basic Concepts ◆ Representations of Linear Functions ◆ Modeling Data with Linear Functions

2.3 The Slope of a Line
Slope ◆ Slope-Intercept Form of a Line ◆ Interpreting Slope in Applications

2.4 Equations of Lines and Linear Models
Point-Slope Form ◆ Horizontal and Vertical Lines ◆ Parallel and Perpendicular Lines

TEACHING TIPS

Section 2.1

I have found that introducing discrete dynamical equations here helps students to understand the concept of the function and the input $\rightarrow f(x) \rightarrow$ output.

$A(n+1) = .5 \cdot a(n),\ n = 0,1,2,3\ldots$

$A(0) = 100$—the initial condition is critical to begin.

Iterate:

$A(1) = .5 \cdot 100 = 50$

$A(2) = .5 \cdot 50 = 25$

$A(3) = .5 \cdot 25 = 12.5$

$\ldots$

These are discrete ordered pairs. Put them on a graph and plot them.

Now move on to $y = f(x) = .3 \cdot x$. You have to put an x in to get a y out.

William P. Fox,
Francis Marion University

◆ ◆ ◆

Students have difficulty evaluating a function from a graph. It needs to be stressed that $f(2)$ has an input or x-value of 2 and they need to find the y-value that it matches from the graph. I draw a dotted line at $x = 2$, then find the y-value of the point by drawing a dotted line from the point to the y-axis.

Jolene Rhodes,
Valencia Community College

◆ ◆ ◆

Do not always use x as the input variable and $f(x)$ as the function notation. The rest of the text uses letters that are reasonable to the problem. Therefore, it is better to use the terms input and output instead of x and y when discussing functions and domain and range.

Jolene Rhodes,
Valencia Community College

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When discussing functions, students often think that if the outputs are the same for different inputs then the relation is not a function. I use the analogy of delivering mail when I teach this in class. If a mail carrier has three letters to deliver (the inputs), then the letters can all go into the same box or different boxes (the outputs). But a single letter (an input) cannot go into multiple mailboxes (the outputs).

Jolene Rhodes,
Valencia Community College

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The multiple representations presented in this chapter should be carried throughout the course. Every time the opportunity arises, try to represent functions in three or four ways.

Marilyn Prine,
Tomball College

◆ ◆ ◆

Problems like 41–46 (reading function values from graphs) show up throughout the book. It is worth the time spent here to help students understand these problems.

Marilyn Prine,
Tomball College

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Be aware that some students have already been introduced to interval notation in previous courses.

Marilyn Prine,
Tomball College

Section 2.2

Mastery of this section is critical for calculus. Slopes of tangent lines and instantaneous rates of change in calculus require thorough knowledge of linear equations. In daily use, knowing how to interpret the slope of a line in context of a scenario is critical. In the House Temperature problem, ensure that students interpret the slope as the temperature *decreases two degrees each hour*.

In the subsection "Representations of Linear Functions," ensure that students do not fall into the trap that $x|y$ tables are the preferred method for obtaining data for plots. This will frustrate them later as functions get more complicated. Students who know that two points make a line might try to only use two points and, again, they are getting the wrong message. Teach techniques that work for most features. Teach the proper use of the calculator and how to set up the window information.

Lead with the cost of tuition and fees and that we need to know about costs for future credit hours. This requires an equation for us to substitute into the credit hours to obtain the cost.

William P. Fox,
Francis Marion University

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Problems 35–40, reading function values from the graph, are usually problems students ask a lot of questions about.

Marilyn Prine,
Tomball College

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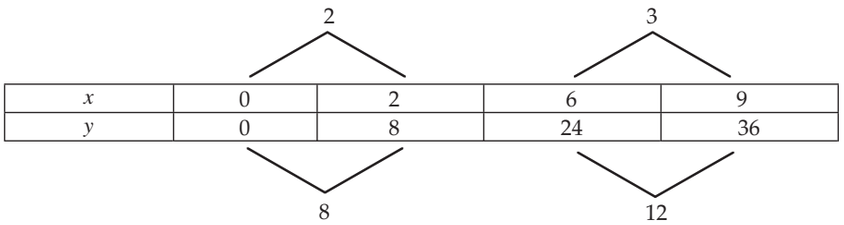
Whatever examples you use to model linear functions in this section should be used again in Section 2.3 when interpreting slope. For example: The activation fee for phone service is $30. The company then charges $40 per month. In Section 2.2, the $30 would be considered the constant, and the $40 would be the rate of change. When using this example again in Section 2.3, you can interpret the rate of change as the slope and make the interpretation of the slope more logical.

Marilyn Prine,
Tomball College

Section 2.3

When given a table, I show my students how to find the slope using the values in the table by finding the change in the outputs and the change in the inputs instead of using the slope formula and plugging in the values. For example:



So, the slope is either $\frac{8}{2} = 4$ or $\frac{12}{3} = 4$ depending on which set of points you pick.

Jolene Rhodes,
Valencia Community College

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When teaching slope, stress the importance of units of measure. This can help the student determine which is the input and which is the output. It also reinforces the idea that slope is a rate of change such as miles per hour, cost per pound, etc.

Jolene Rhodes,
Valencia Community College

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The slope is critical as it ties into everything else. Positive, negative, and zero slopes should be emphasized. Also emphasize standard forms to obtain information. $3y + 3x = 2$ does not have a slope of 3 because $y = -x + \left(\frac{2}{3}\right)$ and the slope is (-1).

William P. Fox,
Francis Marion University

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Use the same example to interpret slope that was used in Section 2.2 to illustrate rate of change.

Marilyn Prine,
Tomball College

Section 2.4

Parallel and perpendicular lines (especially perpendicular) are abstract concepts to students. They do not keep the rules straight. Spend additional time here if possible.

William P. Fox,
Francis Marion University

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For students weak in fractions, show them how they can use their calculators (MATH FRAC) to easily transform equations like: $y - 3 = \frac{3}{4}(x + 5)$ into slope-intercept form.

Marilyn Prine,
Tomball College

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Do a lot of examples using point-slope form so students get used to it. This is something most students are not familiar with or comfortable with.

Marilyn Prine,
Tomball College

Chapter 3: Linear Equations and Inequalities

SECTION TITLES AND TOPICS

3.1 Linear Equations
Equations ◆ Symbolic Solutions ◆ Numerical and Graphical Solutions ◆ Identities and Contradictions ◆ Intercepts of a Line

3.2 Introduction to Problem Solving
Solving a Formula for a Variable ◆ Steps for Solving a Problem ◆ Percentages

3.3 Linear Inequalities
Basic Concepts ◆ Symbolic Solutions ◆ Numerical and Graphical Solutions ◆ An Application

3.4 Compound Inequalities
Basic Concepts ◆ Symbolic Solutions and Number Lines ◆ Numerical and Graphical Solutions ◆ Interval Notation

3.5 Absolute Value Equations and Inequalities
Basic Concepts ◆ Absolute Value Equations ◆ Absolute Value Inequalities

TEACHING TIPS

Section 3.1

If the students are going to make their own tables to solve equations, then point out that if the solution is not immediately found they should look in the direction in which y_1 is getting closer to y_2. If it changes as to which has the larger value (y_1 or y_2), then the solution is between the two input values where this change occurs. This keeps them from searching endlessly and not finding a solution.

Jolene Rhodes,
Valencia Community College

Section 3.2

Have students draw pictures and diagrams when it is reasonable. This helps the visual learners in the class.

Jolene Rhodes,
Valencia Community College

◆ ◆ ◆

Introduce literal equations by first solving the equation: $2x + 3 = 7$. Follow this example with the equation: $ax + b = c$ using the same process and vocabulary.

Marilyn Prine,
Tomball College

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Practice several literal equations before going to the problem solving examples.

Marilyn Prine,
Tomball College

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After working examples 11 and 12, it helps to summarize with %(amount of first item) + %(amount of second item) = %(total amount).

Marilyn Prine,
Tomball College

Section 3.3

Solving inequalities graphically and numerically is one of the most difficult ideas for my students to grasp. This is the one topic that they seem to understand better if it is first introduced in terms of application problems. They understand the concept of whether one item has a higher or lower cost than another on two graphs. It takes a lot of practice and often a group activity will help. If each student can individually have what they are looking for shown to them by you or another student, they understand more than if you show the large group. Also, it helps to highlight the solution on the graph or the table.

Jolene Rhodes,
Valencia Community College

Section 3.4

Students are used to using open and solid dots for graphs of inequalities. Point out the connection between using parentheses and brackets on the graph and their use in interval notation.

Jolene Rhodes,
Valencia Community College

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Introduce interval notation at the beginning, then work each example answering each with a number line graph, set notation AND interval notation.

Marilyn Prine,
Tomball College

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Add $(-\infty,\infty)$ notation for "All Reals" to the examples for interval notation.

Marilyn Prine,
Tomball College

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End the section with a summary of the difference between AND and OR. Use the following examples:

$x > 5$ AND $x < 7$ Soln: $(5, 7)$ then

$x > 5$ OR $x < 7$ Soln: $(-\infty,\infty)$

Marilyn Prine,
Tomball College

Section 3.5

When solving absolute value equations and inequalities, the first step is to isolate the absolute value term on one side of the equation or inequality. This same wording is used again in Section 7.5 when solving radical equations.

Marilyn Prine,
Tomball College

Chapter 4: Systems of Linear Equations

SECTION TITLES AND TOPICS

4.1 Systems of Linear Equations in Two Variables
Basic Concepts ◆ Graphical and Numerical Solutions ◆ Types of Linear Systems

4.2 The Substitution and Elimination Methods
The Substitution Method ◆ The Elimination Method ◆ Models and Applications

4.3 Systems of Linear Inequalities
Solving Linear Inequalities in Two Variables ◆ Solving Systems of Linear Inequalities

4.4 Introduction to Linear Programming
Basic Concepts ◆ Region of Feasible Solutions ◆ Solving Linear Programming Problems

4.5 Systems of Linear Equations in Three Variables
Basic Concepts ◆ Solving Linear Systems with Substitution and Elimination ◆ Modeling Data ◆ Systems of Equations with No Solutions ◆ Systems of Equations with Infinitely Many Solutions

4.6 Matrix Solutions of Linear Systems
Representing Systems of Linear Equations with Matrices ◆ Gauss-Jordan Elimination ◆ Using Technology to Solve Systems of Linear Equations (Optional)

4.7 Determinants
Calculation of Determinants ◆ Area of Regions ◆ Cramer's Rule

TEACHING TIPS

Section 4.1

Be sure to have students determine what may be reasonable solutions when solving application problems. I ask, "Do we need only the first quadrant or more than the first quadrant?" at the start of each application.

Jolene Rhodes,
Valencia Community College

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Pick a good "real" example and motivate the solution first via graphical representation. This sets the tone for other solution methods later.

William P. Fox,
Francis Marion University

◆ ◆ ◆

When discussing the three types of systems in Figure 4.7, it is also helpful to discuss the types of answers that go along with these:

a) a point (x, y)
b) no solution
c) infinite solutions $\{(x, y) | ax + by = c\}$

instead of trying to do it within the application problems.

Marilyn Prine,
Tomball College

Section 4.2

When solving symbolically, I stress to my students that they are finding a coordinate point so they need to find the value of both variables.

Jolene Rhodes,
Valencia Community College

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Have students check their answers graphically or numerically once they have solved the problem symbolically. This helps them make a connection between the methods of solution and reinforces that they are finding a point on a graph as their solution.

Jolene Rhodes,
Valencia Community College

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On the application problems, suggest that the student use the question to decide on the variables needed as the first step in solving the problem. Also, point out that there are sometimes two ideas in the problem (such as how many and how much or going upstream and going downstream) and these will help form the two equations in the system.

Jolene Rhodes,
Valencia Community College

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Repeat your motivating example from Section 4.1 by using both substitution and elimination. Spend some time discussing strategies for use of each method.

William P. Fox,
Francis Marion University

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For the wind/current problems, take the time to develop the idea of downstream (with the wind) as boat $+$ current (or plane $+$ wind), and upstream (against the wind) as boat $-$ current (plane $-$ wind). These problems show up again in Chapter 6, so time spent here will pay off later.

Marilyn Prine,
Tomball College

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Use a *DRT* (call it a "DiRT chart") chart to help organize all information involved in wind/current problems:

	D	R	T
Upstream	75	$b - c$	5
Downstream	75	$b + c$	3

This same format can be used again in Chapter 6.

Marilyn Prine,
Tomball College

Section 4.3

Really emphasize graphing the inequalities. Review Chapter 2 material. Perhaps teach the short cut if the form of the inequality is $3x + 2y \leq 6$:

Cover $2y$, solve $3x = 6$, x-intercept is 2.

Cover $3x$, solve $2y = 6$, y-intercept is 3.

Connect $(2,0)$ and $(0,3)$ to obtain the line $3x + 2y = 6$.

Pick a candidate test point, usually $(0,0)$, and substitute: $3(0) + 2(0) \leq 6$. $0 \leq 6$ is true so we shade the region that contains the true test point.

This will really help with Section 4.4

William P. Fox,
Francis Marion University

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Be sure to include an example where dividing both sides by a negative is involved, for example: $2x-5y < 20$ transforms to $y > \frac{2}{5}x - 4$.

Marilyn Prine,
Tomball College

Section 4.4

This is a "way cool" section and should not be skipped. Students get an opportunity to synthesize material from Chapters 2 and 4 in this section. Emphasize the graphical aspects. Including a take-home mini-project for this section is helpful.

William P. Fox,
Francis Marion University

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If the lesson is done using an overhead, a piece of raw spaghetti is helpful to illustrate the "cost line." Place the spaghetti on the graph with the slope of the cost equation. Keeping the same slope, drag the spaghetti across the region. The last point reached is the optimum value.

Marilyn Prine,
Tomball College

Section 4.5

Stress to the students that they need to check their solutions and work in an organized manner in case they need to find an error in their work. It is very easy to make one small mistake in these problems because of the number of steps required to solve them.

Jolene Rhodes,
Valencia Community College

Section 4.6

When first writing the augmented matrix for a system of three variables and three equations, it is helpful to put the x, y, and z above the first three columns so students can see how the reduced row-echelon form will represent the solution to the system.

$$\begin{matrix} \boldsymbol{x} & \boldsymbol{y} & \boldsymbol{z} & \\ \end{matrix}$$
$$\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 8 \end{bmatrix}$$ So $x = 3$, $y = 2$, and $z = 8$.

Marilyn Prine,
Tomball College

Section 4.7

When using Cramer's rule, D, D_x, and D_y notation helps. D_x is the determinant formed when x-coefficients are replaced by the constants, and D_y is the determinant formed when the y-coefficients are replaced by the constants.

Marilyn Prine,
Tomball College

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When using Cramer's rule, color coding the coefficients and constants helps students see where the numbers come from.

Marilyn Prine,
Tomball College

Chapter 5: Polynomial Expressions and Functions

SECTION TITLES AND TOPICS

TEACHING TIPS

Section 5.1

For most intermediate algebra courses, this section is a review of previously taught skills. Some kind of "Bee" or other review game is a fun way to make sure the students know the correct terms and operations. Students can be divided into teams and compete for points or small prizes. Teams of 4 or 5 students tend to keep everyone focused and in the game. A member of each team can be sent to the board. The first correct response wins the point; an incorrect response passes to the next team to win the point. Or, the team works the problem together and designates someone to go to the board. The first person there gets to write the answer. If that answer is correct he or she wins the point.

Debbie Garrison,
Valencia Community College

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When determining how many terms are in a polynomial expression, I explain that the terms are each separated by either addition or subtraction.

I do several examples to illustrate like terms and explain how $3x^2y + 5xy^2$ and $3x^2y + 5x^2y$ are different from one another and that the latter one can be simplified because $3x^2y$ and $5x^2y$ are like terms.

When subtracting polynomials, students often forget to distribute the negative sign. I have students place the number 1 between the negative sign and the parenthesis to help them remember. Start with $(x + y^2) - (5x + 6y^2)$, then have students rewrite this as $(x + y^2) - 1(5x + 6y^2)$. For some reason when they see the digit 1, it helps to remind them to distribute the negative sign.

When combining polynomial expressions with several terms, I recommend that students put a hatch mark through the terms as they are used. This helps to prevent using the same term more than once.

To evaluate any polynomial expression, I have students use parentheses where a substitution occurs. This helps to keep track of the signs. Given $4a + 3b^2$, calculate the value when $a = -5$ and $b = -7$. The substitution looks like the following: $4(-5) + 3(-7)^2$. Students can now enter the expressions into the calculator and the correct order of operations will take place.

Students often find it difficult to find $f(0)$ or $f(5)$ on a graph. I review several of such examples and explain how it is the same as substituting in the value of 0 for x or 5 for x. I also use the calculator and the table function to help.

I find it best to use the graphing calculator when looking at any modeling problem. I use the graph and table functions to help students to "see" what is happening in an application. Additional explanations are needed to help students to understand when $x = 0$, it is the year 1980, so when $x = 3$, it is 1983, and so on.

C.B. Gubitose,
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Practice reading function values from the graph (students struggle just like they did in Section 2.1)

Marilyn Prine,
Tomball College

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Show how to find function values on the graphing calculator (2 methods): Method 1: in $y =$ type the function, on the home screen, type $y_1(3)$ to evaluate $f(3)$ (get y_1 in VARS menu) Method 2: In $y =$ type function, in table set, set independent variable to ASK, look in table and type in x values to produce y values.

Marilyn Prine,
Tomball College

Section 5.2

It is important that students understand the patterns that occur as polynomials are multiplied. The next step is to factor polynomials and that cannot be done with any success unless the students are familiar with the patterns. Stress patterns!

Debbie Garrison,
Valencia Community College

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First, I review all of the exponential product rules. I then go through examples by first multiplying a monomial by a monomial, then a monomial by a binomial (explaining that this is the same as the distributive property) and then I multiply a monomial times a trinomial. Once all of those combinations are done, I then proceed to a binomial times a binomial, bringing in the concept of the "FOIL" method. I do go over a binomial times a trinomial, but also explain that it is not difficult, just tedious.

C.B. Gubitose,
Southern Connecticut State University

Section 5.3

Factoring is most easily done if students can recognize the different patterns that are common and if they have a factoring plan. The first step in the factoring plan should be to look for common factors and factor them out. Then, classify the problem by type and use the known patterns: difference of squares, perfect square trinomials, sums and differences of cubes, factoring by grouping (4 terms), and general trinomial factoring. Make sure as you introduce each type of problem, you use the correct name and emphasize how each is identifiable.

Factoring, ultimately, is a tool for solving equations. Keep the problems simple enough that factoring would actually be the preferred method to solve a given problem.

Debbie Garrison,
Valencia Community College

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Students seem to grasp factoring best after being shown several examples. In addition to reviewing examples, I also explain that factoring is the reverse of the distributive property, and that after we are done factoring, if we use the distributive property, we should get back the same expression with which we started.

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Southern Connecticut State University

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For the zero-product property I set each factor equal to zero and solve. For example, $(x + 4)(x - 2)$ becomes $x + 4 = 0$ or $x - 2 = 0$. So, $x = -4$ or $x = 2$. I then incorporate the graphing calculator and explain how the graph of $y_1 = x + 4$ will cross the x-axis when $x = -4$. If a fractional value is the answer, I have students enter their example into y_1 and then let $y_2 = 0$. I use the intersection function under the calc menu to find where the graph of y_1 intersects the x-axis. This value gives a solution to the equation.

C.B. Gubitose,
Southern Connecticut State University

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When introducing the Zero-Product Property, you might play a guessing game with the class. Tell them you are thinking of two numbers and when you multiply the two numbers together, the product is zero. Ask the class to tell you about the numbers. Once you have established that at least one of the numbers must be zero, try another game. Tell them you are thinking of two different numbers and their product is 24. Ask what they know about these numbers. Make sure that they realize that they really don't know anything about these numbers. This is why we have a Zero-Product Property and not a 6-Product Property, etc.

Debbie Garrison,
Valencia Community College

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Factoring by grouping is difficult at first for most students. I work out several simple examples like $5(a + b) - x(a + b)$, where the $(a + b)$ is the common term, and then mark those so that it is clear to see that what remains is the $5 - x$. That becomes our second factor.

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Add an example like: $x(2x - 1) + 5(2x - 1)$ to Example 2, when taking out a GCF. This helps when factoring by grouping.

Marilyn Prine,
Tomball College

Section 5.4

I have designed my own method for factoring trinomials that students seem to rave about and understand quickly. I only use this one method since students seem to really get stuck if they see more than one method. The initial explanation is a bit abstract and I ask students to hang in there for a minute or two and then it will all make sense.

Factoring trinomials of the form $ax^2 + bx + c$ where $a = 1$: First, remind students to pull out any common factors. This may be a valuable step in some examples. Then factor what remains. I use the following ideas for factoring: First, look to see if the last operation is addition or subtraction. I say a "plus" c or a "minus" c. This will break the problems into one of two types—one where the factors are multiplied together and their sum equals the middle term, or are multiplied together and their difference will make up the middle term.

When c is positive $(+)$	When c is negative $(-)$
$ax^2 + bx + c$	$ax^2 + bx - c$
$(+)(+)$	$(+)(-)$
$ax^2 - bx + c$	$ax^2 - bx - c$
$(-)(-)$	$(-)(+)$

Then I have students find all of the factors of c. For instance, the factors of 6 are 1 and 6, and also 2 and 3. The question students then need to ask themselves is whether a pair of numbers adds to be the middle term or gives a difference equal to the middle term. That is why I emphasize and explain why the signs work out the way they do.

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