## Module 6 Highlights

### Andrea Hendricks

**Math 0098 Pre-college Algebra**

<table>
<thead>
<tr>
<th>Topics</th>
<th>Mastered</th>
<th>Reviewed</th>
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<tbody>
<tr>
<td>Identifying solutions to a system of linear equations (Sect. 4.1, Obj. 1 &amp; 2)</td>
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<tr>
<td>Classifying systems of linear equations from graphs (Sect. 4.1, Obj. 5)</td>
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<tr>
<td>Graphically solving a system of linear equations (Sect. 4.1, Obj. 3 &amp; 4)</td>
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<tr>
<td>Interpreting the graphs of two functions (Sect. 4.1 Obj. 6)</td>
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<tr>
<td>Solving a system of linear equations using substitution (Sect. 4.2, Obj. 1 and 3)</td>
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<td>Solving a system of linear equations using elimination with addition (Sect. 4.3, Obj. 1 and 3)</td>
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<tr>
<td>Solving a system of linear equations that is inconsistent or consistent dependent (Sect. 4.2 &amp; 4.3, Obj. 2)</td>
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<tr>
<td>Solving a word problem using a system of linear equations of the form Ax + By = C (Sect. 4.3, Obj. 4)</td>
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<tr>
<td>Evaluating expressions with exponents of zero (Sect. 5.1, Obj. 3)</td>
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<tr>
<td>Power of 10: Negative exponent (Sect. 5.1, Obj. 4)</td>
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<tr>
<td>Evaluating an expression with a negative exponent: Whole number base (Sect. 5.1, Obj. 4)</td>
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<tr>
<td>Evaluating an expression with a negative exponent: Positive fraction base (Sect. 5.1, Obj. 4)</td>
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<tr>
<td>Evaluating an expression with a negative exponent: Negative integer base (Sect. 5.1, Obj. 4)</td>
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<td>Rewriting an algebraic expression without a negative exponent (Sect. 5.1, Obj. 4)</td>
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<tr>
<td>Understanding the product rule of exponents (Sect. 5.1, Obj. 1)</td>
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<td>Introduction to the product rule of exponents (Sect. 5.1, Obj. 1)</td>
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<td>Product rule with positive exponents: Univariate (Sect. 5.1, Obj. 1)</td>
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<td>Introduction to the power of a power rule of exponents (Sect. 5.2, Obj. 1)</td>
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<td>Internoction to the quotient rule of exponents (Sect. 5.1, Obj. 2)</td>
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<td>Simplifying a ratio of univariate monomials (Sect. 5.1, Obj. 2)</td>
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<td>Introduction to the product rule with negative exponents (Sect. 5.1, Obj. 5)</td>
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<td>Quotient rule with negative exponents: Prob. type 1 (Sect 5.1, Obj. 5)</td>
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<td>Power of a power rule with negative exponents (Sect. 5.2, Obj. 1)</td>
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<tr>
<td>Power and quotient rules with negative exponents (Sect. 5.2 Obj. 2)</td>
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<tr>
<td>Scientific notation with positive exponent (Sect. 5.2, Obj. 3)</td>
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<td>Scientific notation with negative exponent (Sect. 5.2, Obj. 3)</td>
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**Things You Need to Know**

**Section 4.1 Solving Systems of Linear Equations Graphically**

1. A system of linear equations is a set of two or more equations that must be solved _______________. (4.1, Obj. 1)

2. The solution of a system of linear equations in two variables is an _______________ _______________ that satisfies both equations in the system. (4.1, Obj. 1)

3. Graphically, a solution of a system of two linear equations is the ordered pair that the two lines have in _______________; that is, the point where the two lines _______________. This is called the _______________ _______________. (4.1, Obj. 2)

4. To solve a system of linear equations graphically, (4.1, Obj. 3)
   a. Graph each equation in the system on the _______________ set of axes.
   b. Identify the ordered pair of the _______________ _______________.
   c. Check that the ordered pair is the solution by _______________ the point in each equation.

5. There are three types of systems of linear equations. (4.1, Obj. 4)
   a. A system that contains parallel lines and has no solutions is called an _______________ system.
   b. A system that contains the same lines with infinitely many solutions is called a _______________ system with _______________ equations.
   c. A system that contains intersecting lines with one solution is called a _______________ system with _______________ equations.

6. To determine how the lines in a system of linear equations relate, the number of solutions, and the type of system without graphing, we can compare the equations’ _______________ and _______________. (4.1, Obj. 5)

<table>
<thead>
<tr>
<th>Intersecting Lines</th>
<th>Parallel Lines</th>
<th>Same Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Intersecting Lines" /></td>
<td><img src="image2.png" alt="Parallel Lines" /></td>
<td><img src="image3.png" alt="Same Lines" /></td>
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<table>
<thead>
<tr>
<th>One solution</th>
<th>No solution</th>
<th>Infinitely many solutions</th>
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</thead>
<tbody>
<tr>
<td>Different slopes; Same or different y-intercepts</td>
<td>Same slopes; Different y-intercepts</td>
<td>Same slopes; Same y-intercepts</td>
</tr>
<tr>
<td>Consistent system with independent equations</td>
<td>Inconsistent system</td>
<td>Consistent system with dependent equations</td>
</tr>
</tbody>
</table>

7. For additional practice: Section 4.1 Exercises 9 – 55 odd
Section 4.2 Solving Systems of Linear Equations by Substitution

8. The goal of the ___________________________ method is to substitute one equation of the system into the other equation of the system so that the new equation has just ________ variable. (4.2, Obj. 1)

9. To solve a system of linear equations by substitution, (4.2, Obj. 2)
   a. Solve one of the equations in the system for one of the _____________.
   b. __________________ the expression found in step 1 into the other equation in the system.
   c. Solve the ____________ equation.
   d. ______________ the value found in step 3 back into one of the equations to find the value of the other variable.
   e. The solution of the system is the ordered pair ____________.
   f. __________ the solution in the system.

10. To solve a special case of a system of linear equations, (4.2, Obj. 2)
    a. Solve one of the ____________________ for one of the ___________________.
    b. __________________ the expression found in step 1 into the other equation in the system.
    c. Solve the ____________ equation.
    d. The resulting equation will be either a _______________ or an _______________.
        i. If the resulting equation is a ______________ statement (i.e., a contradiction), then there is _______ solution of the system.
        ii. If the resulting equation is a ______________ statement (i.e., an identity), then there are ___________ many solutions.

11. To determine how the lines in a system of linear equations relate, it is helpful to understand the equations that result from the substitution process.
    a. After substituting and simplifying each side of the equation, the variable remains and we get something of the form \( x = k \) or \( y = k \), where \( k \) is a constant. This means that there is ________ solution and the system is ______________ with ____________ equations.
    b. After substituting and simplifying each side of the equation, a false statement or contradiction results. This means that there is ________ solution and the system is ______________.
    c. After substituting and simplifying each side of the equation, a true statement or identity results. This means that there are ________________ many solutions and the system is _______________ with ______________ equations.

12. For additional practice: Section 4.2 Exercises 9 – 35 odd

Section 4.3 Solving Systems of Linear Equations by Elimination

13. The goal of the elimination method is to ________ the two equations in the system together so that one of the variables is ______________ - that is, the terms containing that variable add to zero. (4.3, Obj. 1)

14. To solve a system of linear equations by elimination, (4.3, Obj. 1)
   a. Write each equation in the system in ____________ form \( (Ax + By = C) \).
   b. Create a new system with ______________________ as coefficients of one of the variables.
   c. __________ the equations together.
   d. __________ the resulting equation for the variable.
   e. ______________ this value into one of the original equations to find the value of the other variable.
   f. ______________ by substituting the ordered pair into the equations in the original system.

15. To solve a special system of linear equations by elimination, (4.3, Obj. 2)
   a. Apply the steps shown in Objective 1.
b. The equation that results from adding the two equations in the system together will be either a _______________ or an _______________.
   i. If the resulting equation is a ______________ statement (i.e., a contradiction), then there is _______ solution of the system and the lines are ________________.
   ii. If the resulting equation is a ______________ statement (i.e., an identity), then there are ________________ many solutions and the lines are the ________________.

16. The three possible results from applying the elimination method are summarized in the following table. (4.3, Obj. 3)

<table>
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<tr>
<th>Intersecting Lines</th>
<th>Parallel Lines</th>
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<tr>
<td>After adding the two equations, we will get an equation of the form ( x = k ) or ( y = k ), where ( k ) is a constant.</td>
<td>After adding the equations, a false statement or contradiction results; for example, ( 0 = 8 ).</td>
<td>After adding the equations, a true statement or identity results; for example, ( 0 = 0 ).</td>
</tr>
<tr>
<td>One solution</td>
<td>No solution</td>
<td>Infinitely many solutions</td>
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<td>Consistent system with independent equations</td>
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17. For additional practice: Section 4.3 Exercises 5 – 29 odd
18. For additional practice for Sections 4.1 – 4.3, work Exercises 1 – 20 of the Piece It Together Sections 4.1 – 4.3 (page 328).

Section 4.4 Applications of Systems of Linear Equations in Two Variables
19. Review Objective 1, 2, and 3 Examples
20. For additional practice: Section 4.4 Exercises 5 - 21 odd

Chapter 4 Review Materials
- See Chapter 4 Summary on page 356.
- Chapter 4 Review Exercises 1 – 20, 24, 26 – 28
- Chapter 4 Test Exercises 1 - 10

Section 5.1 Rules of Exponents, Zero, and Negative Exponents
21. The product of like bases rule for exponents states that \( b^m \cdot b^n = \___________________________. \) (5.1, Obj. 1)
22. The quotient of like bases rule for exponents states that \( \frac{b^m}{b^n} = \___________________________. \) (5.1, Obj. 2)
23. For a real number \( b \) (\( b \neq 0 \)), \( b^0 = \_____________. \) (5.1, Obj. 3)
24. For a real number \( b \) (\( b \neq 0 \)) and \( n \) a positive integer, \( b^{-n} = \___________________________. \) (5.1, Obj. 4)
25. Review Objective 5 Examples to see how the rules can be used together. (5.1, Obj. 5)
26. For additional practice: Section 5.1 Exercises 9 – 89 odd
Section 5.2 More Rules of Exponents and Scientific Notation

27. The power of a power rule states that \((b^m)^n = \underline{\text{________________}}\). (5.2, Obj. 1)

28. The power of a product rule states that \((ab)^n = \underline{\text{____________}}\). (5.2, Obj. 1)

29. The power of a quotient rule states that \((\frac{a}{b})^n = \underline{\text{___________}}\). (5.2, Obj. 1)

30. Review Objective 2 Examples to see how the exponent rules are used together. (5.2, Obj. 2)

31. A number written in the form \(\underline{\text{____________}}\) is a number written in scientific notation as long as \(\underline{\text{__}} \leq a < \underline{\text{______}}\) and \(n\) is an integer. The number \(a\) is called the \underline{________________}.. (5.2, Obj. 3)

32. To write a number in scientific notation, (5.2, Obj. 3)
   a. Move the original decimal point to the ________ or __________ until you reach a number that is between _______ and ________.
   b. The exponent of 10 represents the number of __________ ___________ that you moved in step 1. If the decimal is moved left, the exponent of 10 is _________________. If the decimal is moved right, the exponent of 10 is _________________.

33. To convert a number from scientific notation to standard notation, (5.2 Obj. 3)
   a. Drop “__________.”
   b. If \(n > 0\), move the decimal point to the ________ \(n\) places.
   c. If \(n < 0\), move the decimal point to the ________ \(n\) places.

34. Review Objective 4 Examples to see how to perform operations with numbers in scientific notation.

35. For additional practice: Section 5.2 Exercises 9 - 75 odd

Answers

1. together
2. ordered pair
3. common; intersect; point of intersection
4. a. same; b. intersection point; c. substituting
5. a. inconsistent; b. consistent, dependent; c. consistent, independent
6. slopes; y-intercepts
7. practice
8. substitution; one
9. a. variables; b. Substitute; c. resulting; d. Substitute; e. \((x, y)\); f. Check
10. a. equations, variables; b. Substitute; c. resulting; d. contradiction, identity; i. false, no; ii. True, infinitely
11. a. one, consistent, independent; b. no, inconsistent; c. infinitely, consistent, dependent
12. practice
13. add; eliminated
14. a. standard; b. opposites; c. Add; d. Solve; e. Substitute; f. Check
15. b. contradiction, identity; i. false, no, parallel; ii. true, infinitely, same
16. see table
17. practice
18. practice
19. review examples
20. practice
21. \(b^{m+n}\)
22. \(b^{m-n}\)
23. 1
24. \(\frac{1}{b^n}\)
25. Review examples
26. Practice
27. \(b^{mn}\)
28. \(a^n b^n\)
29. \(\frac{a^n}{b^n}\)
30. Review examples
31. \(a \times 10^n; 1; 10\); coefficient
32. a. left, right, 1, 10; b. decimal places; c. positive; d. negative
33. a. \(\times 10^n\); b. right; c. left