Chapters 7 & 8 Study Guide Math 104

1. Make time in your schedule to learn; you cannot take shortcuts.
2. Read each section in your textbook and answer the questions in the study guide before you go to class.
3. Take notes in class, trying to understand as the teacher presents examples and explains concepts.
4. Do your homework (It should be easier after the previous two steps). Make sure to understand what you are doing and be able to solve each problem completely and correctly by yourself.
5. Carry on a conversation with yourself as you work, asking as you start each problem, "What is this? What is my goal? What should my answer look like when I am done?" Then, as you work a problem ask, "What property allows me to take this step?" And at the end, " Does my answer make sense? How can I check it?"
6. Maintain a great attitude about learning Algebra; people who have a good attitude find it easier to learn, and those who learn algebra well usually enjoy it.
7. Go to the lab or your instructor's office and get help when you need it.

Section 7.1 Solving Systems of Equations by Graphing and Substitution

Read section 7.1, pages 374 – 384 and answer the following questions as you read:

1. What is a system of equations?

2. What is a solution of a system of equations?

3. Which of the ordered pairs is a solution of the system:
   (a) (2, -1) or (b) (-1, 2)?

   $$2x + 3y = 4$$
   $$x - 2y = -5$$

   Explain how you know.

4. The author states that the solutions of a system are the points of intersection of the graphs. Explain why this must be true.

5. Explain how to solve a system of equations graphically.

6. Make a note card for each of the following words (found in the box on p. 376): consistent, dependent, and inconsistent. Draw an example for each on the cards.

7. What do you know about a system of two linear equations if the slopes are the same?

8. What do you know about a system of two linear equations if the slopes are the different?

9. What is the goal of solving a system using the method of substitution?

10. Use the method of substitution to solve the system: (follow the steps of example 7)

$$-x+y=5$$
$$x+2y=4$$

11. Read through examples 8- 12 covering up the work in the book and trying to guess the next step before looking.
12. An interest rate problem. Follow the steps of example 13 to solve the interest rate problem:

    A total of $12,000 is invested in two funds paying 8.5% and 10% simple interest. The annual interest is $1140. How much is invested in each bond?

Section 7.2 Solving Systems of Equations by Elimination

Read section 7.2, pages 389 – 394 and answer the following questions as you read:

1. What is the goal of solving a system of equations by elimination?

2. In each of the following systems, add the two equations. Which variable, if any is eliminated?

   a. $\begin{aligned} 2x-5y&=3 \\ 2x+5y&=5 \end{aligned}$ b. $\begin{aligned} -6x+7y&=1 \\ 6x-6y&=4 \end{aligned}$ c. $\begin{aligned} 2x-7y&=8 \\ 2x-4y&=3 \end{aligned}$

3. Look at #2 above and state in words what must be true for a variable to be eliminated when two equations are added.

4. Solve the system by elimination: $\begin{aligned} x-4y&=5 \\ 5x+4y&=7 \end{aligned}$

5. Solve the system by elimination (follow example 2): $\begin{aligned} x-3y&=2 \\ 3x-7y&=4 \end{aligned}$

Section 8.1 Rational Expressions and Functions

Read section 8.1, pages 444 – 449 and answer the following questions as you read:

1. What is a rational function? Give an example different from the text.

2. What does domain mean? What is the domain of a rational function? Why can't the denominator be equal to zero?

3. Find the domain of $g(x)=\frac{6x}{x^2-16}$? Write your answer in interval notation.

4. Evaluate the function in #3 for the indicated values:
   a. $g(7)$ $g(0)$

5. How can you tell a rational function from a rational expression?

6. How do you know when a rational expression is in simplified or reduced form?

7. Explain how you can tell a term from a factor. Which one can you cancel from the numerator and denominator of a rational expression?

8. What is always the first step in simplifying a rational expression? Simplify the following expression and write the steps you take in words to the right of your work.

$$\frac{8x^3 + 4x^2}{20x}$$

Section 8.2 Multiplying and Dividing Rational Expresssions

Read section 8.2, pages 454 - 458 and answer the following questions as you read:

1. If you do not remember how to multiply or divide fractions, go to p. 34 and review the topic.

2. In example 2, the author writes in red "multiply numerators and denominators". He writes them with a dot (multiplication symbol) between, but does he ever multiply the two factors? What does he do in the next step? Why?

3. Multiply and simplify: $\frac{5y-20}{5y+15} \cdot \frac{2y+6}{y-4}$. Explain your steps as you go.

4. Divide and simplify: $\frac{5x}{x+7} \div \frac{10}{x^2+8x+7}$. Explain your steps as you go.

5. Simplify the complex fraction. Explain your steps as you go.

$$\frac{\left(\frac{25x^2}{x-5}\right)}{\left(\frac{10x}{5+4x-x^2}\right)}$$

Section 8.3 Adding and Subtracting Rational Expressions

Read section 8.3, pages 463 - 468 and answer the following questions as you read:

1. What must be true about two fractions before they can be added or subtracted? (If you do not remember how to add and subtract fractions, go to page 31 to review them.)

2. Finish the sentence describing both the numerator and the denominator of the sum: To add two fractions with common denominators,

3. Find the least common multiple of $7x^3$ and $6x^2y$.

4. If you are finding the least common multiples of two (or more) polynomials, what form must the polynomials be written in?

5. Find the least common multiple of $2x^2 - 4$ and $3x+3$.

6. Subtract and describe each step you take to the right of the work.

$$\frac{3y}{y^2 - y - 12} - \frac{y-4}{y^2 + 3y}$$

7. So far you have learned to add, subtract, multiply, and divide rational expressions.
   a. Which operations require you to factor denominators? Why?

   b. Which operations require you to factor numerators? Why?

c. Which operations require you to find a common denominator? Why?

Section 8.4 Solving Rational Equations

Read section 8.4, pages 474 - 480 and answer the following questions as you read:

1. What properties can we use on equations that we cannot use on expressions?

2. In general, what is the first step when solving a rational equation?

3. Why do you need to check your solution when you have solved a rational equation? What helpful tip does the author offer at the bottom of page 477?

4. Solve the equation and write you steps to the right of your work.

$$\frac{12}{x+5}+\frac{5}{x}=\frac{20}{x}$$

Follow example 8 to solve the following story problem:

A manufacturing plant can produce x units of a certain item for $42 per unit plus an additional investment of $60,000. How many units must be produced to have an average cost of $45 per unit?

Verbal model:

Labels:

Equation:

Solve:

Does your answer make sense?

Write your answer in a complete sentence.

<u>Section 8.6 Variation</u>

Read section 8.6, pages 495 - 500 and answer the following questions as you read:

1. Example 1 showed that when 10,000 products sold $142,500 was generated. The solution was 14.25. What does the 14.25 mean?

2. <u>Direct variation</u> Follow example 1: Assume that the total revenue R (in dollars) obtained from selling x units of a product is directly proportional to the number of units sold. When 8,000 units are sold, the total revenue is $232,000.

a. Find a model that relates the total revenue R to the number of units sold x.

b. Find the total revenue obtained from selling 13,000 units.

3. Inverse variation The marketing department of a company has found that the demand for one of its products varies inversely as the price of the product. When the price of the product is $4.25, the monthly demand is 112,000 units.
   a. Find a model that relates the price per unit p to the number of units sold each month x.

   b. Approximate the monthly demand if the price is reduced to $4.00.

4. Joint variation The simple interest for a certain savings account is jointly proportional to the time and the principal. After 5 years, the interest for a principal of $3400 is $1105.
   a. Find a model that relates the interest earned I with the principal P and the time t.

   b. How much interest would a principal of $2000 earn in 4 years?