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Sections covered: 6.1–6.4, 6.6–6.8

Topics covered:

• **Domain of a rational function (6.1)**

– The denominator can't equal zero.

– *Sample problem:* Find the domain of $f(x) = \frac{3x - 2}{x^2 - x - 2}$

• **Simplifying rational expressions (6.1)**

– Factor the numerator and denominator, then cancel whatever you can.

– *Sample problem:* Simplify completely $\frac{x^2 + 6x + 8}{2x^2 - 32}$

• **Multiplying and dividing rational expressions (6.1)**

– Factor and cancel first, then multiply straight across.

* Steps: (1) Factor, (2) Cancel, (3) Multiply

– To divide, flip and multiply the second expression.

– *Sample problems:*

$$\begin{aligned} * & \frac{x^2 - 5x + 6}{x^2 - 2x - 3} \cdot \frac{2x^2 - 2}{2x^2 - 4x} \\ * & \frac{2x^2 - 5x - 12}{4x^2 + 8x + 3} \div \frac{x^2 - 16}{2x^2 + 7x + 3} \end{aligned}$$

• **Adding and subtracting rational expressions (6.2)**

– *Find a common denominator* by finding the LCD of both expressions.

– To find the LCD, factor the denominator of each expression and then list the factors from each.

– Steps: (1) Common denominator (2) Add and simplify numerators, (3) Factor numerator, (4) Cancel if possible.

– To subtract, distribute the negative and then add.

– *Sample problems:*

$$\begin{aligned} * & \frac{3}{x^2 + 2x} + \frac{7}{x^2 - 4} \\ * & \frac{5x}{x^2 + 9x + 20} - \frac{x + 7}{x^2 + x - 12} \end{aligned}$$

- **Simplifying complex rational expressions (6.3)**

- Steps: (1) Multiply top and bottom by LCD of all embedded fraction, (2) Distribute LCD to all terms in top and bottom, (3) Cancel what cancels, (4) Simplify then factor the top and the bottom, (5) Cancel what cancels again.

- *Sample problem:* Completely simplify $\frac{\frac{2}{x+2}}{\frac{1}{x+2} + \frac{2}{x}}$

- **Dividing monomials (6.4)**

- *Sample problem:* Divide $\frac{11a^4b^3 + 22a^3b^4 - 55ab^5}{11ab^3}$

- **Solving rational equations (6.6)**

- Steps: (1) Note what x can't be – don't divide by zero! (2) *Clear denominators* by multiplying both sides of the equation by the LCD – no more fractions! (3) Solve the equation, (4) Check for *extraneous solutions* from Step 1, (5) Check your answer.

- *Sample problem:* Solve $\frac{x+4}{x^2+5x} = \frac{-2}{x^2-25}$

- **Rational formulas (6.7)**

- Solving a rational formula (equation) for a certain variable.

- * *Sample problem:* Solve $p = \frac{a}{1+rt}$ for t .

- Distance, time and speed problems (*I'll give you the formula $t = \frac{d}{r}$.*)

- * *Sample problem:* Jenny and Dennis both jog for 3 miles. Jenny jogs at a speed of 5 MPH. Dennis starts jogging 6 minutes after Jenny and they finish at the same time. How fast does Dennis jog? (*Hint: 6 minutes = $\frac{1}{10}$ hour.*)

- Average cost

- * *Sample problem:* If the cost function for a company that makes vases is $C(x) = 600 + 5x$, find the average cost function $\bar{C}(x)$ and use it to calculate how many vases they must make for the average cost per vase to be \$8.

- **Direct and inverse variation (6.8)**

- *Sample problems:*

- * If y varies directly with x and $y = 14$ when $x = 2$, find y when $x = 4$.

- * If y varies inversely with x and $y = 10$ when $x = 6$, find x when $y = 12$.

Using LCDs:

- When you add or subtract, use the LCD to find a common denominator.
- When simplifying complex fractions, multiply the top and bottom by the LCD to get rid of all “embedded” fractions.
- When solving rational equations, multiply the left and right sides by the LCD to clear the denominators get rid of all fractions.

Suggested exercises: You can do these exercises from your textbook in class if you are caught up on your worksheets and homework, or you may do them at home to help you study for the exam. If you complete them **all** and turn them in on the day of the exam they are worth a total of **2 points of extra credit**.

- Chapter 6 review p. 480-482: #2-14, 22-26, 30-33, 35, 36, 49-55, 57, 59, 61-63, 68