

1 Factoring and Rational Expressions

- Monday:

- Topic: Review of Factoring (5.6)
- Group work and worksheets p. 2-4
- Study skills: Assessment worksheet
- Homework: 5.6

- Tuesday:

- Topic: Rational Expressions and Rational Functions (6.1)
- **Quiz:** 5.6
- Worksheets p. 5-6
- Homework: 6.1

- Wednesday:

- Topic: Adding Rational Expressions (6.2(a))
- Group writing project (6.1)
- Worksheets p. 7-8
- Homework: 6.2(a)

- Thursday:

- Topic: Subtracting Rational Expressions (6.2(b))
- **Quiz:** 6.1, 6.2(a) (*Only LCDs from 6.2*)
- Worksheets p. 9-10
- **Worksheets p. 1-10 due at end of class**
- Homework: 6.2(b)

5.6 Review of Factoring

Factoring using Big X and Grouping together for $ax^2 + bx + c$

- Multiply $a \cdot c$ (*Top of Big X*)
- Break the product up into two factors that add to b (*Bottom of Big X*)
- Break b up into the two factors and use the **2-2 grouping method** to factor the result
- Check by multiplying

Completely factor each of the following trinomials. Don't forget to look for a GCF (Greatest Common Factor) first!

$$3x^2 + 10x + 8$$

$$-5x^4y + 20x^3y^2 - 20x^2y^3$$

1. $x^2 + 4xy - 12y^2$

2. $-x^2 - 2x + 35$

3. $6x^2 + 5x + 1$

4. $12x^3 - 12x^2 - 9x$

(5.6 continued)

General Factoring Strategies:

(1) Always factor out the GCF first.

(2) Look at the number of terms remaining in parentheses.

2 terms: Try factoring as a difference of squares or as a sum or difference of cubes.

$$a^2 - b^2 = (a + b)(a - b)$$

$$a^2 + b^2 \text{ does not factor}$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

3 terms: If the leading coefficient is 1, use the Big X. If leading coefficient is not 1, use the Big X *and 2-2 grouping*.

4 terms: First try 2-2 grouping. Next, try 3-1 grouping (remember 3-1 grouping always ends by factoring a difference of squares).

(3) **Always factor completely**, which means to go back and try to factor factors even further.

(4) **Check your work** by multiplying.

- Factor using the difference of cubes formula: $8x^3 - y^6$

- Factor using 2-2 grouping: $9b^2x + 9b^2y - 16x - 16y$

- Factor using 3-1 grouping: $x^2 - 8x + 16 - y^2$

(5.6 continued)

Factor each of the following completely.

1. $75x^4 - 48y^4$

2. $125x^3 + 27y^3$

3. $64x^3 - y^{30}$

4. $b^2 - 10b + 25 - a^2$

5. $4x^4y - 40x^3y + 100x^2y$

6. $4x^3 + 8x^2 - 100x - 200$

6.1 Rational Expressions and Rational Functions

Find the domain of each of the following **rational functions**. Write your answer in **set-builder notation**.

1. $f(x) = \frac{x+4}{x-9}$

2. $f(x) = \frac{x+4}{5x-7}$

3. $f(x) = \frac{x-1}{x^2+5x-24}$

4. $f(x) = \frac{4}{81x^2-49}$

Simplify the following **rational expressions**.

5. $\frac{x^2+8x+12}{x^2+9x+18}$

6. $\frac{9x^2-4}{3x^2-17x+10}$

7. $\frac{x^2-25}{x^2-10x+25}$

(6.1 continued)

Multiply or divide each of the following **rational expressions**. Be sure to simplify your answers.

8.
$$\frac{3x + 15}{8} \cdot \frac{3}{4x + 20}$$

9.
$$\frac{2x + 4}{4x - 20} \cdot \frac{15 - 3x}{x + 2}$$

10.
$$\frac{3x^2 + 7x - 20}{x^2 + 4x + 4} \cdot \frac{x^2 - 4}{9x^2 - 25}$$

11.
$$\frac{x^2 - 3x - 28}{x - 5} \cdot \frac{5x - 25}{x^2 - 49}$$

12.
$$\frac{20x^6}{7x - 14} \div \frac{50x^8}{2x - 4}$$

13.
$$\frac{3x^2 - 27}{x^2 - 12x + 35} \div \frac{x + 3}{x^2 - x - 20}$$

6.2(a) Adding Rational Expressions

Steps for finding the LCD and adding rational expressions**To find the LCD:**

- (1) Completely factor each denominator.
- (2) List all factors of the first denominator (including *multiplicities*).
- (3) Add to this list any factors of the second denominator **not** already listed (including *multiplicities*).
- (4) The **product** of this list of factors is the **LCD** of the two rational expressions.

Then to add the expressions:

- (5) Write each fraction with the common denominator and add the numerators.
- (6) Simplify the numerator (usually by distributing and then combining like terms).
- (7) Factor the numerator and simplify by canceling if possible.

A student submitted the following **incorrect** work.

$$\begin{aligned}\frac{3}{x+1} + \frac{4}{x-2} &= \frac{3}{x+1} \cdot \frac{1}{x-2} + \frac{4}{x-2} \cdot \frac{1}{x+1} \\ &= \frac{3}{(x+1)(x-2)} + \frac{4}{(x+1)(x-2)} \\ &= \frac{7}{(x+1)(x-2)}\end{aligned}$$

- Describe **in words** what the student did wrong.

- Redo the problem correctly below.

(6.2(a) continued)

Find the LCD for each pair of rational expressions.

1. $\frac{1}{x+4}$ and $\frac{2}{x^2-16}$

2. $\frac{3}{(x+1)(x+2)}$ and $\frac{x-1}{x^2-4}$

3. $\frac{x}{4x-8}$ and $\frac{3x-1}{x^2+2x-8}$

Add the following rational expressions. Simplify your answers.

4. $\frac{3}{2x^3} + \frac{2}{3x^2}$

5. $\frac{-2}{x^2-2x-3} + \frac{3}{x^2-9}$

6. $\frac{1}{x-2} + \frac{3}{2-x}$

7. $\frac{3x+1}{2x-6} + \frac{x+2}{x-3}$

6.2(b) Subtracting Rational Expressions

Add or subtract the following rational expressions and simplify your answers.

1. $\frac{3}{x-2} - \frac{2}{x+3}$

2. $\frac{x}{x^2 + 11x + 30} - \frac{5}{x^2 + 9x + 20}$

3. $\frac{8}{x^2 - 2x + 1} - \frac{x}{x^2 - 1}$

4. $\frac{3x}{x^2 + 6x + 5} - \frac{4x}{x^2 + 5x + 4}$

(6.2(b) continued)

$$5. \frac{x}{x-4} + \frac{x+1}{x^2-16} - \frac{3}{x+4}$$

$$6. \frac{x}{x^2-4} + \frac{2x}{x^2+x-2} - \frac{3x}{x^2-4x+4}$$

2 Complex Fractions and Polynomial Division

- Monday:

- Topic: Complex Fractions (*6.3(a)*)
- Study skills: Home study environment
- Worksheets p. 12-13
- Homework: 6.3(a)

- Tuesday:

- Topic: Using Complex Fractions (*6.3(b)*)
- **Quiz:** 6.2
- Worksheets p. 14-15
- Group work: Work together to do tonight's homework!
- Homework: 6.3(b)

- Wednesday:

- Topic: Dividing by Monomials (*6.4*)
- Worksheets p. 16-18
- Homework: 6.4

- Thursday:

- Topic: Rational Equations (*6.6*)
- **Quiz:** 6.3, 6.4
- Worksheets p. 19-20
- **Worksheets p. 11–20 due at end of class**
- Homework: 6.6

6.3(a) Complex Fractions

Completely simplify the following **complex fractions** by first finding the LCD of all “embedded” fractions.

1.
$$\frac{\frac{3}{x^2} + \frac{1}{x}}{2 - \frac{4}{5x}}$$
 LCD = _____

2.
$$\frac{\frac{1}{x} + \frac{1}{y}}{\frac{1}{x} - \frac{1}{y}}$$
 LCD = _____

3.
$$\frac{\frac{3}{x+2} - \frac{3}{x-2}}{\frac{6}{x^2-4}}$$
 LCD = _____

(6.3(a) continued)

4.
$$\frac{\frac{2}{x+2}}{\frac{1}{x+2} + \frac{2}{x}}$$

LCD = _____

5.
$$\frac{4 - \frac{1}{x^2}}{4 + \frac{4}{x} + \frac{1}{x^2}}$$

LCD = _____

6.
$$\frac{\frac{x+4}{5} - 3}{\frac{1}{2} + \frac{x+4}{10}}$$

LCD = _____

6.3(b) Using Complex Fractions

Follow the steps to simplify the expression below, then **refer to this worksheet while doing tonight's homework**.

$$\frac{\frac{x-4}{x^2-9}}{1+\frac{1}{x-3}} - \frac{1}{x-3}$$

Step 1: Simplify the complex fraction $\frac{\frac{x-4}{x^2-9}}{1+\frac{1}{x-3}}$ by first finding the LCD of all “embedded” fractions.

Step 2: Subtract $\frac{1}{x-3}$ from your answer in Step 1 by first finding a common denominator.

(6.3(b) continued)

Follow the steps to simplify the expression below, then **refer to this worksheet while doing tonight's homework**.

$$\frac{\frac{1}{x+1}}{x - \frac{1}{x - \frac{1}{x}}}$$

Step 1: Simplify the complex fraction $\frac{1}{x - \frac{1}{x}}$ that is found in the denominator of the rational expression above.

Step 2: Plug your answer from Step 1 into the denominator of the expression and then simplify the resulting complex fraction by first finding the appropriate LCD.

Review of 6.1 – 6.4

1. Simplify $\frac{x^2 - x - 6}{x^2 + 3x - 18}$

2. Multiply $\frac{x^3 - 27}{4x^2 - 4x} \cdot \frac{4x}{x - 3}$

3. Add $5 + \frac{7}{x - 2}$

4. Simplify $\frac{x - \frac{4}{x + 6}}{\frac{1}{6 + x} + x}$

(6.1–6.4 review continued)

5. Divide $(28x^8y^3 - 14x^6y^2 + 3x^2y^2) \div (7x^2y)$

6. Subtract $\frac{2x - 1}{x + 6} - \frac{x + 3}{x - 2}$

7. Subtract $\frac{3}{x - 2} - \frac{2}{x + 2} - \frac{x}{x^2 - 4}$

(6.1–6.4 review continued)

8. Divide $\frac{3x^2 - 7x - 6}{3x^2 - 13x - 10} \div \frac{2x^2 - x - 1}{4x^2 - 18x - 10}$

9. Add $\frac{3}{7-x} + \frac{x-2}{x-7}$

10. Simplify $\frac{x+1}{x^2+x-2} - \frac{1}{x^2-3x+2} + \frac{2x}{x^2-4}$

6.6 Rational Equations

Steps for solving rational equations:

- (1) Make note of any x values that cannot be solutions because they would cause you to divide by 0.
- (2) *Clear the denominators* by multiplying both sides of the equation by the LCD of all fractions.
- (3) Solve the resulting equation.
- (4) Remove any impossible solutions (from Step 1).
- (5) Check the remaining solutions by plugging them into the original equation.

Solve the following rational equations.

1. $1 + \frac{4}{x-5} = \frac{2}{x^2-5x}$

2. $\frac{3}{x-5} + \frac{2}{x+5} = \frac{30}{x^2-25}$

3. $\frac{5}{8x} - \frac{7}{4} = \frac{3}{2x}$

(6.6 continued)

Remember, you can **solve** rational **equations**, but you can only **simplify** rational **expressions**.

4. Simplify $\frac{1}{x+2} + \frac{1}{x-2}$

5. Solve $5 = \frac{4}{x} + \frac{9}{x+1}$

6. Solve $\frac{2}{x+3} + \frac{x}{x-3} = \frac{-10}{x^2-9}$

7. Simplify $\frac{2}{x+3} + \frac{x}{x-3} + \frac{10}{x^2-9}$

3 Rational Formulas and Applications

- Monday:

- No class

- Tuesday:

- Topic: Rational Formulas (*6.7(a)*)
- **Quiz:** 6.6
- Worksheets p. 22-23
- Homework: 6.7(a)

- Wednesday:

- Topic: Word Problems with Rational Formulas (*6.7(b)*)
- **LAB:** Laser Beam Reflections
- Homework: 6.7(b)

- Thursday:

- Topic: Direct and Inverse Variation (*6.8*)
- **Quiz:** 6.7
- Worksheets p. 24-25
- **Worksheets p. 21-25 and LAB due at end of class**
- Homework: 6.8

6.7(a) Rational Formulas

Solve each formula for the specified variable.

1. Solve $\frac{V_1}{V_2} = \frac{P_1}{P_2}$ for V_1 .

2. Solve $A = \frac{1}{2}(b_1 + b_2)(h)$ for b_1 .

3. Solve $P = \frac{A}{1 + rt}$ for t .

4. Solve $F = \frac{9}{5}C + 32$ for C . (*This is the formula to convert Celsius to Fahrenheit.*)

5. Solve $V = \frac{1}{3}\pi r^2 h$ for h . (*This is the formula for the volume of a cylinder.*)

(6.7(a) continued)

6. Follow the steps below to solve the following word problem. **You can then refer to these steps when doing your homework.**

The current of a river is 8 MPH. A boat can travel 30 miles with the current in the same amount of time it can travel 20 miles against the current. Find the speed of the boat in still water. In other words, how fast would the boat go if there were no current at all?

Step 1 What does your variable x represent?

$x =$ _____

Step 2 What are the distance traveled and the rate of speed of the boat when it is traveling **with** the current. (*Note: The rate of speed in this case is the boat's speed **plus** the speed of the current.*)

$d_1 =$ _____ $r_1 =$ _____

Step 3 What are the distance traveled and the rate of speed of the boat when it is traveling **against** the current. (*Note: The rate of speed in this case is the boat's speed **minus** the speed of the current.*)

$d_2 =$ _____ $r_2 =$ _____

Step 4 Find formulas for t_1 and t_2 .

$t_1 =$ _____ $t_2 =$ _____

Step 5 How are t_1 and t_2 related?

Step 6 Use Steps 4 and 5 to write and solve an equation for x .

Step 7 Answer the question (what is the speed of the boat in still water), including units, and check that your answer makes sense.

(6.8 continued)

3. A person's arm span varies directly as his or her height. A person who is 6 feet tall has an arm span of 5.6 feet. What is the arm length of a person who is 5.5 feet tall?

4. The water temperature of the Atlantic Ocean varies inversely with the water's depth. At a depth of 1,000 meters, the water temperature is 6.4° Celsius. What is the water temperature at a depth of 4,000 meters?

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4 Exponents and Scientific Notation

- Monday:

- Topic: Exponents (1.6)
- Study skills: Test taking
- Worksheets p. 28-31 (Review for Exam 1)
- Homework: none

- Tuesday:

- **EXAM 1** – Covers sections 6.1-6.4, 6.6-6.8
- Homework: 1.6

- Wednesday:

- Topic: Scientific Notation (1.7(a))
- Group project: Creating word problems (Ch. 1)
- Worksheets p. 32-33
- Homework: 1.7(a)

- Thursday:

- Topic: Operations with Scientific Notation (1.7(b))
- **Quiz:** 1.6, 1.7(a)
- Worksheet p. 34
- **Worksheets p. 27-34 and Group Project due at end of class**
- Homework: 1.7(b)

Review for Exam 1

1. Find the domain of the rational function $\frac{x-2}{x^2+3x+2}$

2. Completely simplify the following rational expressions.

(a) $\frac{x^3 - 9x}{x^2 - 3x}$

(b) $\frac{3x - 12}{x^2 - 4} \cdot \frac{x^2 + 6x + 8}{x - 4}$

(c) $\frac{x^2 + 3x + 2}{x + 5} \div (x + 1)$

(d) $\frac{11a^4b^3 + 22a^3b^4 - 55ab^5}{11ab^3}$

(Exam 1 review continued)

3. Add or subtract the rational expressions by first finding the LCD. Completely simplify your answers

(a)
$$\frac{1}{x+y} + \frac{3xy}{x^3+y^3}$$

(b)
$$\frac{2}{x^2+5x+6} - \frac{4}{x^2+4x+3}$$

(c)
$$\frac{4x}{x^2+6x+5} - \frac{3x}{x^2+5x+4} + \frac{1}{x+1}$$

(Exam 1 review continued)

4. Solve the following rational equations. Don't forget to make note of any x values that cannot be solutions because they would cause you to divide by 0.

(a)
$$\frac{x + 4}{x^2 + 5x} = \frac{-2}{x^2 - 25}$$

(b)
$$1 - \frac{1}{x} = \frac{12}{x^2}$$

5. Completely simplify the complex fractions by first finding the LCD of all "embedded" fractions.

(a)
$$\frac{\frac{3}{x^2} + \frac{1}{x}}{2 - \frac{4}{5x}}$$

(b)
$$\frac{\frac{3}{x+2} - \frac{1}{x-2}}{\frac{4}{x^2-4}}$$

(Exam 1 review continued)

6. Solve $\frac{1}{p} + \frac{1}{r} = \frac{2}{t}$ for p .

7. y varies directly with x . If $y = 4$ when $x = 2$, find y when $x = 10$.

8. y varies inversely with x . If $y = 10$ when $x = 6$, find x when $y = 12$.

9. Two runners, one averaging 8 MPH and the other averaging 10 MPH, run on a track for the same amount of time. If the slower runner runs 6 miles, how far does the faster runner run? (*Hint: Use $t = \frac{d}{r}$ and note that $t_1 = t_2$.*)

1.7(a) Scientific Notation

Write the following numbers in standard decimal notation.

1. 3.956×10^2

2. 2.39×10^{-4}

3. -6.052×10^{-6}

4. 1.001×10^5

Write the following numbers in scientific notation.

5. 84,060,000

6. 0.00012

7. -42.215

8. -0.00201

(1.7(a) continued)

9. The moon has an average distance from the Earth of approximately 2.389×10^5 miles. What is this distance in standard decimal notation?

10. One second is approximately 0.0000000317 years. Convert this number to scientific notation.

Review of exponents: Completely simplify the following expressions.

11. $(-6)^{-2}$

12. $\frac{1}{2^{-1}} + \frac{1}{3^{-1}}$

13. $(4b^{-9})(5b^4)$

14. $\frac{-28b^{-2}c^{-3}}{4b^{-3}c^{-1}}$

1.7(b) Operations with Scientific Notation

Perform the indicated operation. Give answers in scientific notation.

1. $(3.6 \times 10^8)(3 \times 10^2)$

2. $\frac{5.4 \times 10^3}{3 \times 10^6}$

3. $\frac{4.2 \times 10^5}{2.1 \times 10^{-2}}$

4. $(6 \times 10^{10})(2 \times 10^{-8})$

5. $(1.7 \times 10^{-6})(5.2 \times 10^{-4})$

6. $\frac{7.2 \times 10^{12}}{4 \times 10^3}$

5 Radicals and Fractional Exponents

- Monday:

- Topic: Radicals (7.1)
- Study skills: Exam reflection
- Worksheets p. 36-37
- Homework: 7.1

- Tuesday:

- Topic: Fractional Exponents (7.2)
- **Quiz:** 1.7(b), 7.1
- Worksheets p. 38
- Homework: 7.2

- Wednesday:

- Topic: Simplifying Radical Expressions (7.3)
- Group writing project (*Ch. 7*)
- Worksheets p. 39-40
- Homework: 7.3

- Thursday:

- Topic: Operations on Radical Expressions (7.4)
- **Quiz:** 7.2, 7.3
- Worksheets p. 41-42
- **Worksheets p. 35-42 due at end of class**
- Homework: 7.4

7.1 Radicals

Evaluate the following radicals or state that they do not exist.

1. $\sqrt{-16}$

2. $-\sqrt{16}$

3. $\sqrt[3]{-27}$

4. $-\sqrt[3]{27}$

5. $\sqrt[4]{81}$

6. $\sqrt[4]{-81}$

7. $\sqrt{-1}$

8. $\sqrt[3]{-1}$

(7.1 continued)

Answer the questions about the following radical functions.

9. $f(x) = \sqrt{15 - x}$

(a) Find $f(6)$

(b) Find $f(0)$

(c) Find $f(19)$

(d) Find the domain of $f(x)$

10. $g(x) = \sqrt{2x + 5}$

(a) Find $g(4)$

(b) Find $g(-3)$

(c) Find $g(-2)$

(d) Find the domain of $g(x)$

7.2 Rational Exponents

Simplify the following **without** using a calculator, or state that they do not exist.

1. $27^{1/3}$

2. $16^{3/4}$

3. $16^{-1/4}$

4. $32^{1/5}$

5. $64^{2/3}$

6. $-32^{-1/5}$

7. $-9^{3/2}$

8. $(-9)^{3/2}$

9. $3^{7/5} \cdot 3^{3/5}$

10. $\frac{5^{4/3}}{5^{1/3}}$

11. $\frac{7^{1/3}}{7^{-5/3}}$

7.3 Simplifying Radical Expressions

Simplify the following radicals by factoring.

1. $\sqrt[4]{160}$

2. $\sqrt{63}$

3. $\sqrt{y^{18}}$

4. $\sqrt{4x^4}$

5. $\sqrt[3]{x^{17}}$

6. $\sqrt[4]{x^4y^7}$

7. $\sqrt{24x^4}$

(7.3 continued)

Simplify the following radicals by factoring.

8. $\sqrt[3]{16b^{13}}$

9. $\sqrt{75x^{15}y^9}$

10. $\sqrt[3]{x^8y}$

11. $\sqrt[5]{32x^{19}y^{13}}$

Multiply and simplify.

12. $(-5\sqrt{w})(4\sqrt{w})$

13. $(4\sqrt{2x})(\sqrt{8})$

14. $(-3\sqrt[3]{10x})(2\sqrt[3]{4x^5})$

15. $\sqrt[5]{x} \cdot \sqrt[3]{x}$

7.4 Operations on Radical Expressions

Simplify the following by adding or subtracting.

1. $4\sqrt{7x} + 9\sqrt{7x}$

2. $4\sqrt[3]{3} + 3\sqrt[3]{3} - 5\sqrt[3]{3}$

3. $\sqrt{12x^4} + \sqrt{75x^4}$

4. $\sqrt[3]{27x^7} + 2x^2\sqrt[3]{8x^4}$

5. $\sqrt{200} + \sqrt{72} + \sqrt{50}$

(7.4 continued)

Simplify the following radical expressions.

6.
$$\frac{\sqrt{14x}}{\sqrt{7x}}$$

7.
$$\sqrt{\frac{50x^3y^4}{2xy}}$$

8.
$$\frac{\sqrt[3]{40a^6b^4}}{\sqrt[3]{5b}}$$

9.
$$\sqrt[5]{\frac{64y^7}{2y^2}}$$

6 Radical Equations

- Monday:

- Topic: Distributing Radicals and Rationalizing Denominators (7.5)
- Study skills: Note taking
- Worksheets p. 44-45
- Homework: 7.5

- Tuesday:

- Topic: Solving Square Root Equations (7.6(a))
- **Quiz:** 7.4, 7.5 (*Only multiplying and distributing from 7.5*)
- Worksheets p. 46
- Homework: 7.6(a)

- Wednesday:

- Topic: Solving Radical Equations (7.6(b))
- Group work (*Ch. 7 review*)
- Worksheets p. 47-48
- Homework: 7.6(b)

- Thursday:

- Topic: Exponential Functions (9.1)
- **Quiz:** 7.5, 7.6
- Worksheets p. 49-50
- **Worksheets p. 43-50 due at end of class**
- Homework: 9.1

7.5 Distributing Radicals and Rationalizing Denominators

Multiply and simplify the following rational expressions.

1. $4\sqrt{2x}(\sqrt{8} - 3\sqrt{x})$

2. $(4\sqrt{x} + \sqrt{3})(4\sqrt{x} - \sqrt{3})$

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

4. $(2\sqrt{x} - \sqrt{7})^2$

5. $(3\sqrt[3]{x^2} + 2)^2$

Rationalize the denominators in the following fractions.

6. $\frac{2}{\sqrt{x}}$

7. $\sqrt{\frac{25}{x}}$

8. $\frac{7}{6\sqrt{3x}}$

(7.5 continued)

9.
$$\frac{\sqrt{5y^5}}{\sqrt{7x}}$$

10.
$$\frac{5}{\sqrt[3]{2x^2}}$$

11.
$$\frac{7x}{4\sqrt[3]{x^2}}$$

12.
$$\frac{6}{\sqrt{3}-1}$$

13.
$$\frac{\sqrt{7}}{\sqrt{5}+\sqrt{3}}$$

14.
$$\frac{\sqrt{x}+5}{\sqrt{x}-3}$$

15.
$$\frac{\sqrt{7}+\sqrt{3}}{\sqrt{7}-\sqrt{3}}$$

16.
$$\frac{2\sqrt{x}+\sqrt{y}}{\sqrt{y}-2\sqrt{x}}$$

7.6(a) Solving square root equations

Solve the following equations involving square roots. Don't forget to check for extraneous solutions.

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

2. $\sqrt{x} = -7$

3. $2\sqrt{x} + 6 = 12$

4. $\sqrt{x^2 + 2x} = x + 5$

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

6. $1 + \sqrt{2x+5} = 2x$

7.6(b) Solving radical equations

Solve the following equations involving radicals. Don't forget to check for extraneous solutions.

1. $2\sqrt{x-1} - \sqrt{3x-1} = 0$

2. $\sqrt[3]{10x-3} = \sqrt[3]{6x+2}$

3. $(3x-7)^{1/3} + 4 = 6$

(7.6(b) continued)

4. $\sqrt{x} + 3 = \sqrt{3x + 9}$

5. $(4x + 9)^{1/3} = (3 - 2x)^{1/3}$

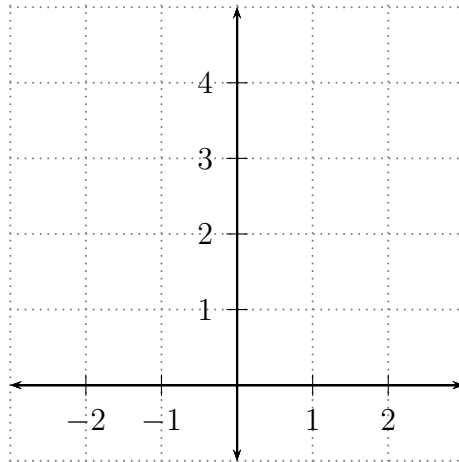
6. $\sqrt{x + 8} = \sqrt{x - 4} + 2$

7. $(8 - 3x)^{1/3} = -1$

9.1 Exponential Functions

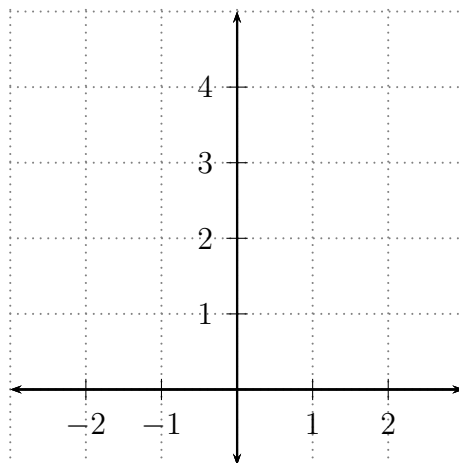
1. Sketch a graph of the function $f(x) = \left(\frac{1}{2}\right)^x$ by first completing the table and plotting points.

x	-2	-1	0	1	2
y					



2. Sketch a graph of the function $f(x) = \left(\frac{1}{2}\right)^x + 1$ by first completing the table and plotting points.

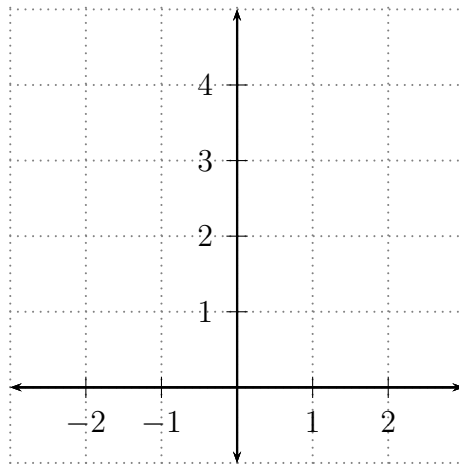
x	-2	-1	0	1	2
y					



(9.1 continued)

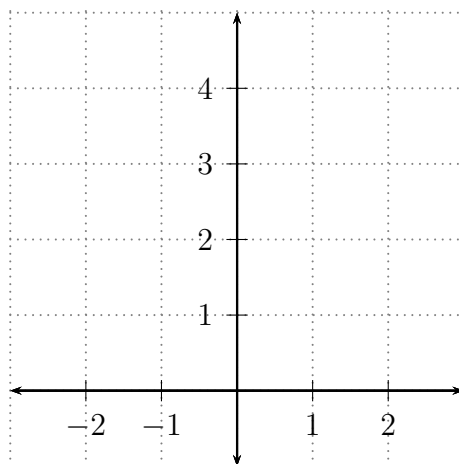
3. Sketch a graph of the function $f(x) = 2^x$ by first completing the table and plotting points.

x	-2	-1	0	1	2
y					



4. Sketch a graph of the function $f(x) = \frac{1}{3} \cdot 2^x$ by first completing the table and plotting points.

x	-2	-1	0	1	2
y					



7 Composite, Inverse and Logarithmic Functions

- Monday:
 - No class
- Tuesday:
 - Topic: Composite and Inverse Functions (9.2)
 - Study skills: Tests with less stress
 - Worksheets p. 52-56 (Review for Exam 2)
 - Homework: none
- Wednesday:
 - **EXAM 2** – Covers sections 1.6-1.7, 7.1-7.6
 - Homework: 9.2
- Thursday:
 - Topic: Logarithmic Functions (9.3(a))
 - Worksheets p. 57-58
 - **Worksheets p. 51-58 due at end of class**
 - Homework: 9.3(a)

Review for Exam 2

1. Simplify the following expressions involving **exponents**. Your answers should not include negative exponents.

(a) -4^{-3}

(b) $\frac{50x^{-7}y}{20x^2y^{-1}}$

(c) $(3x^{-2})^{-1}$

2. Write 2.001×10^{-3} in standard decimal notation.

3. Write 4, 120, 000, 000 in scientific notation.

4. Multiply $(2 \times 10^{10})(1.2 \times 10^{-2})$

5. Divide $\frac{2.2 \times 10^8}{4 \times 10^{10}}$

(Exam 2 review continued)

6. Simplify the following **radicals** or state that they do not exist. Answers should not include complex or imaginary numbers.

(a) $-\sqrt{25}$

(b) $\sqrt[4]{-81}$

(c) $\sqrt[3]{-27}$

(d) $\sqrt[7]{-1}$

7. Find the domain of the function $f(x) = \sqrt{2x - 12}$

8. Simplify the following expressions with **rational exponents** or state that they do not exist.

(a) $27^{2/3}$

(b) $-16^{1/4}$

(c) $(-16)^{1/4}$

(d) $32^{-2/5}$

(e) $3^{5/3} \cdot 3^{4/3}$

(f) $\frac{11^{6/5}}{11^{1/5}}$

(Exam 2 review continued)

9. Simplify the following **radicals**. You may want to factor first.

(a) $\sqrt[3]{16}$

(b) $\sqrt[4]{x^5}$

(c) $\sqrt{4x^6}$

(d) $\sqrt{50x^9y^8}$

10. **Rationalize the denominators** in the following expressions.

(a) $\frac{5}{2\sqrt{x}}$

(b) $\frac{1}{\sqrt{3xy} - 2x}$

(c) $\frac{3}{\sqrt[3]{2x^2}}$

(Exam 2 review continued)

11. Perform the following operations on **radical expressions** and simplify your answers.

(a) $(3\sqrt{2x^4})(2\sqrt{8})$

(b) $\sqrt[4]{x} \cdot \sqrt[3]{x^2}$

(c) $4\sqrt{7} + 4\sqrt{7} - 15\sqrt{7}$

(d) $3\sqrt[4]{160} - 10\sqrt[4]{10}$

(e) $\frac{\sqrt[3]{27x^4}}{\sqrt[3]{8x}}$

(f) $\sqrt[5]{\frac{64y^{10}}{2x^{15}}}$

(g) $(3\sqrt[3]{x} + 1)(3\sqrt[3]{x} - 1)$

(h) $(\sqrt{x^3y} + \sqrt{5x})^2$

(Exam 2 review continued)

12. **Solve** the following equations involving radicals. Don't forget to check for **extraneous solutions**.

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

(b) $3\sqrt{x} + 9 = 18$

(c) $2\sqrt{x - 1} - \sqrt{3x - 1} = 0$

(d) $\sqrt[3]{8 - 3x} = 1$

9.3(a) Logarithmic Functions

Find the **inverse** of each of the following functions.

1. $f(x) = 5^x$

2. $g(x) = \log_7 x$

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

Rewrite each **logarithm** as an exponent.

4. $\log_2(32) = 5$

5. $\log_3(81) = 4$

Rewrite each exponent as a **logarithm**.

6. $2^6 = 64$

7. $10^5 = 100,000$

(9.3(a) continued)

Rewrite each **logarithm** as an exponent, then find x .

8. $\log_7 49 = x$

9. $\log_3 3 = x$

10. $\log_2 1 = x$

11. $\log_4 64 = x$

12. $\log_3 \left(\frac{1}{3}\right) = x$

13. $\log_2 \left(\frac{1}{8}\right) = x$

14. $\log_{16} 4 = x$

15. $\log_{49} 7 = x$

8 Logarithmic Equations

- Monday:

- Topic: Graphing Logarithmic Functions (*9.3(b)*)
- Study skills
- Worksheets p. 60-61
- Homework: 9.3(b)

- Tuesday:

- Topic: Log Properties (*9.4*)
- LAB: Properties of Logarithms
- **Quiz:** 9.1-9.3
- Worksheets p. 62-63
- Homework: 9.4

- Wednesday:

- Topic: Exponential and Logarithmic Equations (*9.5*)
- Worksheets p. 64-65
- Homework: 9.5

- Thursday:

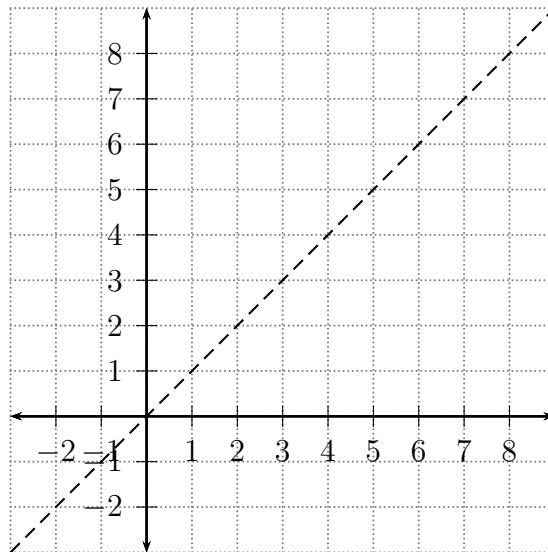
- Topic: Exponential Growth and Decay (*9.6(a)*)
- **Quiz:** 9.4, 9.5
- Worksheets p. 66
- **Worksheets p. 59-66 and LAB due at end of class**
- Homework: 9.6(a)

9.3(b) Graphing Logarithmic Functions

1. Complete the following table of values for $y = f(x) = 2^x$.

x	-2	-1	0	1	2	3
y						

2. Plot your points on the graph below and connect them with a smooth curve. Label this curve $y = 2^x$ and find its domain and range.



Domain = _____

Range = _____

3. The **inverse** of a function can be obtained by switching the *input* and the *output* i.e. switching the x and y values. Use your table from #1 to fill in the table below for the **inverse** of $f(x) = 2^x$.

x						
y	-2	-1	0	1	2	3

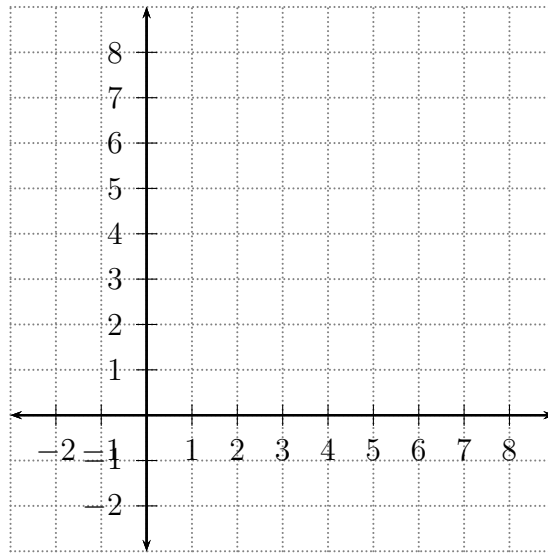
4. **Using a different color pen or pencil**, plot these points on the same graph above.
5. If $f(x) = 2^x$, then $f^{-1}(x) =$ _____ (in terms of logarithms). Label the graph from #4 with your answer to this question.
6. Look at your graph and table in #3 and #4 and determine the domain and range of the **inverse** of $f(x) = 2^x$.

Domain of $f^{-1}(x) =$ _____

Range of $f^{-1}(x) =$ _____

(9.3(b) continued)

7. Graph the function $y = \log_4 x$ by first making a table of values for the *inverse* and then switching the role of x and y for the graph.



Evaluate the following **logarithms** using your calculator. Round your answers to 2 decimal places.

8. $\ln 5$

9. $\log 20$

9.4 Log Properties

Expand each expression as much as possible.

1. $\log_4(5x)$

2. $\log(x^2y^4)$

3. $\log_6\left(\frac{3}{4y}\right)$

4. $\log\left(\frac{x^2y}{7}\right)$

5. $\ln\sqrt[3]{\frac{x}{2}}$

6. $\log_5\left(\frac{x^2}{\sqrt[4]{y}}\right)$

(9.4 continued)

Use log properties to combine the following expressions into a single logarithm.

7. $\log_2 7 + \log_2 x$

8. $3 \log x - \log y - 5 \log c$

9. $\ln(6x - 4) - \ln 2$

10. $\frac{1}{4} \log_4(x) - \log_4(2 + y)$

Evaluate the following **logarithms** using your calculator. Round your answers to 2 decimal places.

11. $\log_3 7$

12. $\log_8 3$

13. $\log_7 10$

9.5 Exponential and Logarithmic Equations

Solve the following equations for x or state if there is no solution. Round your answer to 2 decimal places if necessary.

1. $10^x = 50$

2. $3 \cdot 2^x = 17$

3. $2 \cdot 4^x = 500$

4. $-3 + 2^x = 20$

5. $\log_3 x = 2$

6. $\log x = -1$

7. $\log_{16} x = \frac{3}{4}$

8. $3 \log_8 x + 5 = 6$

(9.5 continued)

Solve the following equations by first using log properties to combine the logarithms into one expression.

Don't forget to check for *extraneous solutions*.

9. $\log_3(x) + \log_3(6x) = 3$

10. $\log_4(12x) - \log_4(6) = 3$

11. $4\log_3(2x) - 3\log_3(x) = 4$

12. $\log(x^9) - 3\log(x^2) = 3$

9.6(a) Exponential Growth and Decay

1. According to the U.S. Bureau of the Census, in 1990 there were 22.4 million residents of Hispanic origin living in the U.S. By 2005, the number had grown to 41.9 million.
 - (a) Find an **exponential growth model** $f(t) = A_0e^{kt}$ that describes the U.S. Hispanic population in millions, where t represents the number of years after 1990. Round k to 2 decimal places.
 - (b) What is the **growth rate** for the U.S. Hispanic population as a percent?
 - (c) According to your model, in what year will the U.S. Hispanic population reach 80 million?

2. The **half-life** of Polonium-210 is 140 days.
 - (a) Find an **exponential decay model** $f(t) = A_0e^{kt}$ that models Polonium-210. Round k to 3 decimal places.
 - (b) How long will it take for a sample of Polonium-120 to decay to 30% of its original amount?

9 Inequalities and Absolute Values

- Monday:

- Topic: Exponential and Logarithmic Models (9.6(b))
- LAB: Earthquakes and Richter Magnitude
- LAB: Global warming
- Homework: 9.6(b)

- Tuesday:

- Topic: Review of Linear Inequalities (4.1)
- Group work and worksheets p. 68-69
- **Quiz:** 9.6
- Homework: 4.1

- Wednesday:

- Topic: Compound Inequalities (4.2)
- Study skills
- Worksheets p. 70-71
- Homework: 4.2

- Thursday:

- Topic: Absolute Value (4.3(a))
- **Quiz:** 4.2
- Worksheets p. 72
- **Worksheets p. 67-72 and both LABs due at end of class**
- Homework: 4.3(a)

4.1 Review of Linear Inequalities

1. Work with your classmates to complete the table below. Then I will ask for volunteers to help complete the table on the board.

Inequality	Set-builder	Interval	Number line
$x > 3$	$\{x x > 3\}$	$(3, \infty)$	
$x \leq 2$			
		$(-2, 5]$	
$-2 < x \leq 0$			
	$\{x x \leq 4\}$		
		$[4, \infty)$	

2. We will work as a class to solve each inequality on the board.

(a) $-x \leq 5$

(b) $5x + 43 > 98$

(c) $7x + 25 < 3x - 15$

(4.1 continued)

3. Solve each inequality.

(a) $-50 - 3x \geq 10$

(b) $-2(4x - 32) \leq -40$

(c) $-2(x - 3) > 3x - 24$

(d) $\frac{x+1}{2} + \frac{1}{4} \geq \frac{3x+6}{8}$

(e) $\frac{2x-3}{6} \geq \frac{x}{2} + \frac{1}{3}$

4.2 Compound Inequalities

Solve each of the following **compound inequalities**. Express your answer in **set-builder notation**, **interval notation** and as a **number line graph**.

1. $3x \geq 0$ and $x + 2 \leq 4$

2. $-3 < 2 + x < 3$

3. $-2x - 5 < -3$ or $6x + 2 < x + 2$

(4.2 continued)

4. $-8 \leq 3x - 2 < 10$

5. $x + 6 < 0$ or $4x > -12$

6. $x + 3 < 8$ and $3x - 2 \leq 4$

4.3(a) Absolute Value

Solve the following equations involving absolute values. Don't forget to check your answers.

- $|2x - 3| = 6$

- $|5 - 4x| = 11$

- $-2|2x - 3| + 3 = -11$

- $|x - 3| = -4$

- $|2x - 7| = 0$

10 Absolute Values, Distances, Circles and Sequences

- Monday:

- Topic: Absolute Value Inequalities (*4.3(b)*)
- Study skills
- Worksheets p. 74
- Homework: 4.3(b)

- Tuesday:

- Topic: Distances and Circles (*10.1*)
- **Quiz:** 4.3
- Worksheets p. ???
- Homework: 10.1

- Wednesday:

- Topic: Sequences and Summation Notation (*11.1*)
- Worksheets p. ??? (Review for Exam 3)
- Homework: none

- Thursday:

- **EXAM 3** – Covers sections 9.1-9.6, 4.2-4.3, 10.1
- **Worksheets p. ??? due**
- Homework: 11.1

4.3(b) Absolute Value Inequalities

1. Follow the steps below to solve the inequality $|2x - 1| < 2$
 - (a) Is this an “*and*” inequality or an “*or*” inequality?
 - (b) Use your answer to part (a) to write $|2x - 1| < 2$ as a **compound inequality** and solve these two inequalities.
 - (c) Write your solution from part (b) in **set-builder** notation, **interval** notation, and as a **number line graph**.

2. Follow the steps below to solve the inequality $4|x - 3| + 5 \geq 25$
 - (a) **Isolate** the absolute value expression.
 - (b) Is this an “*and*” inequality or an “*or*” inequality?
 - (c) Use your answer to part (b) to write a **compound inequality** and solve these two inequalities.
 - (d) Write your solution from part (c) in **set-builder** notation, **interval** notation, and as a **number line graph**.

11 Sequences and Series

- Monday:

- Topic: Arithmetic Sequences (*11.2(a)*)
- Worksheets p. ???
- Study skills
- Homework: 11.2(a)

- Tuesday:

- Topic: Arithmetic Series (*11.2(b)*)
- **Quiz:** 11.1
- Worksheets p. ???
- Homework: 11.2(b)

- Wednesday:

- Topic: Geometric Sequences and Series (*11.3*)
- LAB: Fibonacci Sequence
- Worksheets p. ???
- Homework: 11.3

- Thursday:

- Topic: Review for Final Exam
- **Worksheets p. ??? and LAB due at end of class**
- Homework: none