1. Day 2: Appendix A, Day 1 of 2

1.1. **Review Questions.** 1. State the rules for factoring $x^2 - y^2$, $x^3 - y^3$, and $x^3 + y^3$. Verify that the formulas are correct by multiplying out the factored expressions.

2. Explain what it means for an expression to be a rational expression. How do you add or subtract two rational expressions? How do you multiply them? How do you divide one by another?

1.2. **Basic Skills.** Use the laws of exponents to simplify the following:

3. x^3x^5

4. $\frac{x^3}{x^5}$

5. $\frac{x^{a+b}}{x^a}$

6. $(y^3y^4)^{\frac{1}{5}}$

7. $\left(\frac{4x^{-2}y^3}{x^{\frac{1}{2}}y^{-\frac{1}{3}}}\right)^3$

8. $\left(\frac{27x^3y^4}{8}\right)^{\frac{1}{3}}$

Factor each of the following completely:

9. $x^2 + 5x - 6$

10. $x^2 + 5x + 6$

11. $6x^2 + 13x - 5$

12. $x^4 - 16$

13. $4ax^2 + 28ax + 49a$

14. $2x^3 + 16$

15. $8x^3y^3 - 64$

16. $x^3 - x^2 - x + 1$

Simplify the following expressions completely:

17. $\frac{4x}{x^2-9} - \frac{5}{x-3}$

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

19. $\frac{x^2(x^2-4)^{-\frac{1}{2}} - (x^2-4)^{\frac{1}{2}}}{x^2}$

20. $\frac{1}{x+h} - \frac{1}{x}$

21. $\frac{\frac{3}{\sqrt{x+h}}-\frac{3}{\sqrt{x}}}{h}$

1.3. **Explain Why or Why Not.** 22. Determine whether the following statements are true, and give an explanation or a counterexample.

a. $\frac{0}{0}=1$.

b. The function $f(x)=x^{\frac{2}{7}}$ is never negative for any value of x.

c. $\sqrt{a+b}=\sqrt{a}+\sqrt{b}$ for all a and b.

d. $(a+b)^n=a^n+b^n$ for all a and b and any positive integer n.

e. The expression x^2+y^2 cannot be factored, but x^2-y^2 can be factored.

2. Day 3: Appendix A, Day 2 of 2

2.1. **Review Questions.** 1. Explain what the slope of a line is in relation to the graph of that line. If you are given the equation of a line, how do you find its slope? Are there any other ways you can find the slope of a line without its equation?

2. If the slope of a given line L is m, what is the slope of every line parallel to L? What is the slope of every line perpendicular to L?

3. Write $f(x)=|2x-8|$ as a piecewise function. Give an interpretation of $f(x)$ in terms of the distance between x and another number.

2.2. **Textbook Exercises.** p.1067, numbers 1, 2, 6, 31, 33-44.

2.3. **Distance Formula.** Given the following points A and B, find the distance between A and B.

4. $A=(-8,-2)$, $B=(4,3)$

5. $A=(0,0)$, $B=(a,b)$

6. $A=(-2,1)$, $B=(4,-7)$

7. $A=(5,-5)$, $B=(11,-4)$

2.4. **Explain why or why not.** 8. Determine whether the following statements are true, and give an explanation or a counterexample.

a. The point (1,1) is inside the circle of radius 1 centered at the origin.

b. $\sqrt{x^2}=x$ for all real numbers x.

c. $(\sqrt{x})^2=x$ for all real numbers x.

3. Day 4: Equations and Inequalities

3.1. **Basic Skills.** Solve the following for x:

1. $7x - 5 = 4 - 2(3 - x)$
2. $x^2 + 4x = 5$
3. $3x^2 + 4x + 1 = 0$
4. $5x^2 - 4x = 12$
5. $x^3 - kx^2 - x + k = 0$
6. $\frac{x^2}{x+3} = -4$
7. $x + \frac{4}{x} = 4$
8. $|x^2 + 2x| + 1 = 0.$

Find all values of x satisfying the following inequalities. State the solution in interval notation.

9. $(2x - 1)(x - 3)(x - 5) < 0$
10. $x^2 + bx \geq 0$
11. $x^3 - 4x < 0$
12. $4x^2 + 5x + 1 > 0$
13. $\frac{-8(x-3)^{\frac{1}{3}}}{(6-x)^{\frac{5}{3}} x^{\frac{4}{3}}} > 0$
14. $|2x - 5| \geq 7$
15. $|4x + 3| < \varepsilon$
16. $|ax + 4| > 3$, $a \neq 0$

4. Day 5: Section 1.1

4.1. **Textbook Exercises.** p. 7, numbers 1, 2, 3, 5, 7, 9, 10; 21, 23, 26, 28, 30; 31, 32, 34; 47, 49, 50, 52 (no graphing); 55, 58, 73, 74

5. Day 6: Section 1.2

5.1. **Textbook Exercises.** p. 19, numbers 2, 3, 5-10, 17, 20, 30-32, 40, 41, 44-47, 52-54

6. Day 7: Section 1.3

6.1. **Textbook Exercises.** p. 31, numbers 1, 2, 5, 6, 11-15, 17-21, 41-43, 58

6.2. **Explain why or why not.** Determine whether the following statements are true, and give an explanation or a counterexample.

a. If there is a horizontal line that intersects the graph of $y = f(x)$ zero times, then $f(x)$ is not invertible.

b. $3^{2x} = 9^x$.

c. If $f(x) = \frac{1}{x}$, then $f^{-1}(x) = \frac{1}{x}$.

d. If $f(x) = \sqrt{x}$, then the domain of $f^{-1}(x)$ is all real numbers.

7. Day 8: Section 1.4

7.1. **Textbook Exercises.** p. 43, numbers 1, 4, 5, 7, 8, 15, 17, 18, 19, 66, 67, 69, 71, 72, 75, 76

7.2. **Explain Why or Why Not.** Determine whether the following statements are true, and give an explanation or a counterexample.

a. $\sin(x + y) = \sin x + \sin y$.

b. If (x, y) is a point on the unit circle, and the segment from (x, y) to the origin makes an angle of θ with the positive x-axis, then $\cos\theta = x$ and $\sin\theta = y$.

c. All of the six trigonometric functions are positive in the first quadrant, but there is no quadrant where all of the six trigonometric functions are negative.

d. In a right triangle, $\sec\theta$ is the length of the hypotenuse of the triangle divided by the length of the side opposite θ.

8. Day 9: Trigonometric Equations

8.1. **Review Questions.** 1. How many solutions does $\cos x = \frac{1}{2}$ have?

2. How many solutions does $\cos x = \frac{1}{2}$, $0 \le x < 2\pi$ have?

3. How many solutions does $\cos 3x = \frac{1}{2}$, $0 \le x < 2\pi$ have?

4. To solve the equation $\sin x = y$, must y be in the domain or range of $\sin x$?

5. To solve the equation $\sec^2 x = 2\tan^2 x$, can you multiply both sides of the equation by $\cos^2 x$? Explain why or why not.

8.2. **Basic Skills.** Find all solutions to the following trigonometric equations in $[0, 2\pi)$:

6. $\sin x = \frac{\sqrt{3}}{2}$
7. $\tan x = -1$
8. $\csc^2 x = 2$
9. $\sec 4x = -2$
10. $\sin 3x = \cos 3x$
11. $2\sin^2 x + \sin x = 1$
12. $2\cos^2 x + 7\cos x = 4$
13. $\sin 2x \sin x - \cos x = 0$
14. $\cos 2x + \sin^2 x = \frac{1}{2}$
15. $\sec^2 x = 2\tan^2 x$
16. $\tan^2 x + \sec x - 1 = 0$

8.3. **Explain Why or Why Not.** 17. Determine whether the following statements are true, and give an explanation or a counterexample.

a. There are 2 values of x in $[0, 2\pi)$ where $\cos x = 3$.

b. There is exactly one solution to $\tan x = 0$ in $[0, 2\pi)$.

c. If $\sin 2x = 1$, then $\sin x = \frac{1}{2}$.

d. If $\cos x = y$ has a solution in $[0, 2\pi)$, then $\cos x = -y$ also has a solution in $[0, 2\pi)$.

e. If $\cos x = y$ has at least one solution in $[0, 2\pi)$, then $\cos x = y$ must have exactly two solutions in $[0, 2\pi)$.