1. Solve the compound inequality.

\[ 4x + 2 \geq -10 \text{ and } 3x - 4 < 8 \]

Graph the solution on the number line.

2. Solve the compound inequality.

\[ 4v - 3 < -23 \text{ and } 2v + 2 \leq 14 \]

Write the solution in interval notation. If there is no solution, enter \( \emptyset \).

3. Solve for \( u \).

\[ 5|u + 4| - 72 = -12 \]
4. Graph the solution to the inequality on the number line.

\[ |4y + 12| \geq 16 \]

5. Solve.

\[ 6|y - 3| - 1 \leq 29 \]

6. Find an equation for the line below.
7. Write equations for the horizontal and vertical lines passing through the point $(8, -6)$.

   horizontal line: \\
   vertical line:

8. Consider the line $y = 7x - 1$.

   (a) Find the equation of the line that is perpendicular to this line and passes through the point $(-3, 2)$.

   (b) Find the equation of the line that is parallel to this line and passes through the point $(-3, 2)$.

9. Suppose that the relation $T$ is defined as follows.

   $$T = \{(-4, 0), (-9, 2), (8, 2)\}$$

   Give the domain and range of $T$.
   Write your answers using set notation.

10. Find the domain of the function.

    $$v(x) = \sqrt{24 - 8x}$$

    Write your answer using interval notation.
11. Suppose that the weight (in pounds) of an airplane is a linear function of the total amount of fuel (in gallons) in its tank. When graphed, the function gives a line with a slope of 5.9. See the figure below.

With 46 gallons of fuel in its tank, the airplane has a weight of 2271.4 pounds. What is the weight of the plane with 77 gallons of fuel in its tank?

12. Use substitution to solve the system.

\[ 4x + 5y = -10 \]
\[ y = 3x + 17 \]

\[ x = \boxed{} \]
\[ y = \boxed{} \]

13. A chef is going to use a mixture of two brands of Italian dressing. The first brand contains 9% vinegar, and the second brand contains 14% vinegar. The chef wants to make 330 milliliters of a dressing that is 13% vinegar. How much of each brand should she use?

First brand: _____ milliliters
Second brand: _____ milliliters
14. Solve the following system of equations.

\[-7x - 6y = -2\]
\[-9x - 4y = 16\]

15. One month Deandre rented 5 movies and 3 video games for a total of $27. The next month he rented 2 movies and 12 video games for a total of $81. Find the rental cost for each movie and each video game.

16. Factor.

\[8y^3 - 125\]

17. Solve for \(w\).

\[3w^2 = -11w - 6\]

18. Solve for \(y\).

\[2y^2 - 14y + 16 = (y - 3)^2\]

If there is more than one solution, separate them with commas.

19. The length of a rectangle is 5 ft more than twice the width, and the area of the rectangle is 42 ft\(^2\). Find the dimensions of the rectangle.
20. For the following right triangle, find the side length $x$. Round your answer to the nearest hundredth.

![Right Triangle Diagram]

21. Find all excluded values for the expression. That is, find all values of $v$ for which the expression is undefined.

\[ \frac{5v - 3}{v + 2} \]

If there is more than one value, separate them with commas.

22. The function $h$ is defined below.

\[ h(x) = \frac{x - 4}{x^2 - 14x + 48} \]

Find all values of $x$ that are NOT in the domain of $h$. If there is more than one value, separate them with commas.

23. Multiply.

\[ \frac{49x^2 - 4}{3x^2 - 2x - 21} \cdot \frac{3x - 9}{7x - 2} \]

Simplify your answer as much as possible.
24. Multiply.

\[
\frac{4x + 16}{49x - 28} \cdot \frac{7x - 4}{2x + 8}
\]

Simplify your answer as much as possible.

25. Divide.

\[
\frac{x^2 - 3x + 2}{x^2 + 3x + 2} \div \frac{4x - 4}{x + 2}
\]

Simplify your answer as much as possible.


\[
\frac{x^2 - 12xy + 20y^2}{x^2 - 9y^2} \div \frac{2x - 20y}{x + 3y}
\]

Simplify your answer as much as possible.

27. Subtract.

\[
\frac{6}{x} - \frac{5}{x + 3}
\]

Simplify your answer as much as possible.

28. Subtract.

\[
\frac{x}{6x - 7} - \frac{x - 1}{8x}
\]

Simplify your answer as much as possible.
29. Add.

\[
\frac{x}{4 - 3x} + \frac{8x}{3x - 4}
\]

Simplify your answer as much as possible.

30. Add.

\[
\frac{2}{3x^2 - 4x - 15} + \frac{1}{3x^2 + 17x + 20}
\]

Simplify your answer as much as possible.

31. Simplify.

\[
\frac{6w}{w^2 + w - 20} - \frac{3}{w - 4}
\]

32. Simplify.

\[
\frac{10}{x - 7} + x
\]

\[
\frac{2}{x - 7} + 1
\]
33. Simplify.
\[
8 - \frac{8}{w}
\]
\[
\frac{8 - \frac{8}{w}}{w - 1}
\]

34. Simplify.
\[
\frac{5}{y} - \frac{1}{x}
\]
\[
\frac{1}{y^2} - \frac{3}{x}
\]

35. Simplify.
\[
\frac{1}{u^{-2} + v^{-2}}
\]
Write your answer using only positive exponents.

36. Divide.
\[
(4x^3 + 14x^2 + 16x + 8) \div (2x + 1)
\]
Your answer should give the quotient and the remainder.

Quotient:

Remainder:
37. Divide.

\[(2x^2 + 21x + 47) ÷ (x + 7)\]

Your answer should give the quotient and the remainder.

Quotient:

Remainder:

38. Use synthetic division to find the quotient and remainder when \(-x^4 + 4x^3 + 12x^2 - 8\) is divided by \(x - 6\). Specifically, complete the synthetic division table below, and write your answer in the following form: Quotient + \(\frac{\text{Remainder}}{x - 6}\).

\[
\begin{array}{c}
6) \quad -1 & 4 & 12 & 0 & -8 \\
& & & & \\
& & & & \\
& & & & \\
& & & & \\
& & & & \\
\end{array}
\]

\[
\frac{-x^4 + 4x^3 + 12x^2 - 8}{x - 6} = \square + \frac{\square}{x - 6}
\]

39. Solve for \(x\).

\[
\frac{-8}{x} = \frac{-14}{x - 3}
\]
40. Solve for $y$.

\[-\frac{3}{5y+15} + 1 = -\frac{6}{y+3}\]

41. Solve for $w$.

\[\frac{1}{w-3} + \frac{4}{w+3} = \frac{1}{w^2 - 9}\]

42. Solve for $x$.

\[\frac{3}{x+5} = \frac{x}{x+8}\]

43. Solve for $y$.

\[\frac{y-2}{y+6} + 1 = \frac{y+6}{y+3}\]

44. Solve for $h$.

\[F = \frac{g}{4 + h}\]
45. Solve for \( z \).

\[
\frac{8}{z} = \frac{9}{x} + \frac{5}{y}
\]

46. Working together, two pumps can drain a certain pool in 4 hours. If it takes the older pump 12 hours to drain the pool by itself, how long will it take the newer pump to drain the pool on its own?

Do not do any rounding.

47. A plane has a cruising speed of 300 miles per hour when there is no wind. At this speed, the plane flew 600 miles with the wind in the same amount of time it flew 400 miles against the wind. Find the speed of the wind.

48. Simplify.

\[
\sqrt{245}
\]

49. Simplify.

\[
\sqrt{24x^{10}z^7}
\]

Assume that all variables represent positive real numbers.

50. Write the following in simplified radical form.

\[
\frac{4}{\sqrt{32}}
\]
51. Write the following as a radical expression.

\[ \frac{7}{t^8} \]

52. Evaluate.

\[ \frac{1}{125^3} = \ldots \]
\[ \frac{1}{256^4} = \ldots \]

53. Simplify. Write your answers without exponents.

\[ \left( \frac{1}{16} \right)^{-\frac{3}{4}} = \ldots \]
\[ 4^{-\frac{5}{2}} = \ldots \]

54. Simplify as much as possible.

\[ w\sqrt{18x^3} - x\sqrt{50xw^2} \]

Assume that all variables represent positive real numbers.
55. Simplify.
\[-4 \sqrt{48} + 4 \sqrt{243}\]

56. Simplify.
\[\sqrt{54} \times 4 \sqrt{50}\]

57. Simplify.
\[\sqrt{8y^8u^2} \sqrt{2y^5u^4}\]
Assume that all variables represent positive real numbers.

58. Simplify.
\[\frac{\sqrt{48} - 6}{18}\]

59. Rationalize the denominator and simplify.
\[\frac{-5}{7 - 2\sqrt{y}}\]
Assume that the variable represents a positive real number.
60. Rationalize the denominator and simplify.

\[ \frac{-5}{7 - 2\sqrt{5}} \]
Final Exam Review Part 1 #5 Answers for class Intermediate Algebra / MAT 135 Fall 2016 Master

1.

2. \((-\infty, -5)\)

3. \(u = 8, -16\)

4.

5. \(-2 \leq y \leq 8\)

6. \(y = -\frac{4}{7}x - \frac{22}{7}\)

7. horizontal line: \(y = -6\)
   vertical line: \(x = 8\)

8. Equation of perpendicular line: \(y = -\frac{1}{7}x + \frac{11}{7}\)

   Equation of parallel line: \(y = 7x + 23\)

9. domain = \([-4, -9, 8]\)
   range = \([0, 2]\)
10. \((-\infty, 3]\)

11. 2454.3 pounds

12. \(x = -5\)
    \(y = 2\)

13. First brand: 66 milliliters
    Second brand: 264 milliliters

14. \(x = -4\)
    \(y = 5\)

15. Rental cost for each movie: $1.50
    Rental cost for each video game: $6.50

16. \((2y - 5)(4y^2 + 10y + 25)\)

17. \(-\frac{2}{3}, -3\)

18. \(y = 7, 1\)

19. Length: 12 ft
    Width: 3.5 ft

20. 7.55

21. \(v = -2\)

22. \(x = 6, 8\)

23. \(\frac{3(7x + 2)}{3x + 7}\)
24. \( \frac{2}{7} \)

25. \( \frac{x - 2}{4(x + 1)} \)

26. \( \frac{x - 2y}{2(x - 3y)} \)

27. \( \frac{x + 18}{x(x + 3)} \)

28. \( \frac{(2x - 1)(x + 7)}{8x(6x - 7)} \)

29. \( \frac{7x}{3x - 4} \)

30. \( \frac{1}{(x + 4)(x - 3)} \)

31. \( \frac{2w}{w + 5} \)

32. \( x - 2 \)

33. \( \frac{(w - 1)^2}{w(w - 2)} \)

34. \( \frac{y(5x - y)}{x - 3y^2} \)

35. \( \frac{u^2v^2}{v^2 + u^2} \)

36. Quotient: \( 2x^2 + 6x + 5 \)
   Remainder: 3
37. Quotient: \(2x + 7\)
   Remainder: \(-2\)

38. \[6)\begin{array}{cccc}
1 & 4 & 12 & 0 \pm 8 \\
\hline
6 & -12 & 0 & 0 \\
\hline
-1 & -2 & 0 & 0 \pm 8
\end{array}\]

\[\begin{align*}
-x^4 & + 4x^3 & + 12x^2 & - 8 \\
\hline 
\end{align*}\]

\[
\frac{-x^4 + 4x^3 + 12x^2 - 8}{x - 6} = -x^3 - 2x^2 + \frac{-8}{x - 6}.
\]

39. \(x = -4\)

40. \(y = -\frac{42}{5}\)

41. \(w = 2\)

42. \(x = -6, 4\)

43. \(y = 6, -4\)

44. \(h = \frac{g}{F} - 4\)

45. \(z = \frac{8xy}{9y + 5x}\)

46. 6 hours

47. Speed of the wind: 60 miles/hour

48. \(7\sqrt{5}\)

49. \(2x^5z^3\sqrt{6z}\)

50. \(2\sqrt[4]{2}\)
51. \( \sqrt[8]{t^7} \)

52. \[
\begin{align*}
125^{\frac{3}{3}} & = 5 \\
256^{\frac{4}{4}} & = 4 \\
125^{\frac{3}{3}} & = 5 \\
256^{\frac{4}{4}} & = 4
\end{align*}
\]

53. \[
\left( \frac{1}{16} \right)^{-\frac{3}{4}} = 8 \\
4^{-\frac{5}{2}} = \frac{1}{32}
\]

54. \(-2wx\sqrt{2x}\)

55. \(-5\sqrt[4]{3}\)

56. \(120\sqrt{3}\)

57. \(4y^6u^3\sqrt{y}\)

58. \[
\frac{2\sqrt{3} - 3}{9}
\]

59. \[
\frac{-35 - 10\sqrt{y}}{49 - 4y}
\]

60. \[
\frac{-35 - 10\sqrt{5}}{29}
\]