

Homework Assignments

MATH150 ALGEBRA and TRIGONOMETRY

HOMEWORK 1.

Section 1.1 (The Real Number System)

In Exercises 9 through 20, determine whether the given statement is true (T) or false (F). Problem 19 Hint: If you are stuck, Google on “sum of two irrational”

9. -14 is a natural number.
 10. $-4/5$ is a rational number.
 11. $\pi/3$ is a rational number.
 12. $1.75/18.6$ is an irrational number.
 13. -1207 is an integer.
 14. 0.75 is an irrational number.
 15. $4/5$ is a real number.
 16. 3 is a rational number.
 17. 2π is a real number.
 18. The sum of two rational numbers is always a rational number.
 19. The sum of two irrational numbers is always an irrational number.
 20. The product of two rational numbers is always a rational number.
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Problems 23, 24, 28, 35

In Exercises 23–36, the letters represent real numbers. Identify the property or properties of real numbers that justify each statement.

23. $a + x = x + a$
 24. $(xy)z = x(yz)$
 28. $5 + (x + y) = (x + y) + 5$
 35. $5 \cdot 1/5 = 1$
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Find values for a and b for which the statement is true.

Problem 38 $a/b = b/a$

Problem 40. $(a + b)(c + d) = ac + bd$

Calculator Problems 53, 54, 55, 57, 58, 61, 62

53. Perform the indicated operations. Verify your answers using your calculator.

a. $(-8) + 13 =$

b. $(-8) + (-13) =$

c. $8 - (-13) =$

d. $(-5)(3) - (-12) =$

e. $\left(\frac{8}{9} + 3\right) + \left(\frac{-5}{9}\right) =$

f. $\frac{-5}{\frac{3}{2}} =$

g. $\frac{\frac{5}{8}}{\frac{1}{2}} =$

h. $\frac{\frac{-2}{3}}{\frac{-4}{3}} =$

HOMEWORK 1., continued

53. Perform the indicated operations. Verify your answers using your calculator.
(continued)

$$\begin{array}{l}
 \text{i. } \left(\frac{3}{4}\right)\left(\frac{21}{37}\right) + \left(\frac{3}{4}\right)\left(\frac{16}{37}\right) = \text{j. } \frac{\frac{1}{3} - \left(\frac{-1}{4}\right)}{\frac{7}{8} - \frac{3}{16}} = \\
 \text{k. } \frac{\left(\frac{3}{5}\right)\left(\frac{1}{7}\right)}{\frac{1}{2} + \frac{1}{3}} = \text{l. } \frac{2\left(\frac{3}{2} \cdot \frac{4}{7}\right)}{=}
 \end{array}$$

54. What is the meaning attached to each of the following?

- a. 6/0
- b. 0/6
- c. 6/6
- d. 0/1/2
- e. 0/0

55. Use your calculator to convert the following fractions to (repeating) decimals. Look for a pattern that repeats.

- a. $\frac{1}{4} =$
- b. $-\frac{3}{5} =$
- c. $\frac{10}{13} =$
- d. $\frac{2}{7}$
- e. Does your calculator round off the final digit of an approximations or does your calculator 'drop off' the extra digits?
To answer this question, evaluate $\frac{2}{3}$ to see if it displays:
0.6666666666 or 0.6666666667

57. On a map of Pennsylvania, 1 inch represents 10 miles. Find the distance represented by 3.5 inches.

58. A car travels 135 miles on 6 gallons of gasoline. How far can it travel on 10 gallons of gasoline?

61. Which is the better value: 1 pound 3 ounces of beans for 85 cents, or, 13 ounces for 56 cents?

62. A piece of property is valued at \$28,500. What is the real estate tax at \$75.30 per \$1000.00 evaluation?

HOMEWORK 2.

Section 1.3 (Expressions and Polynomials)

page 28: Problems 4, 27, 42, 44, 49, 50, 58, 82

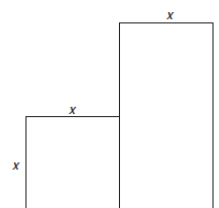
4. Evaluate the given expression when $r = 2$, $s = -3$, and $t = 4$.
 $(r + s)t$

27. Which of the following expressions are *not* polynomials?

- a. $-3x^2 + 2x + 5$ b. $-3x^2y$
 c. $-3x^{2/3} + 2xy + 5$ d. $-2x^{-4} + 2xy^3 + 5$

42. A field consists of a rectangle and a square arranged as shown in Figure 4. What does each of the following polynomials represent?

- a. $x^2 + xy =$
 b. $2x + 2y =$
 c. $4x =$
 d. $4x + 2y =$



44. $(4x^2 + 3x + 2) + (3x^2 - 2x - 5) =$

49. $a^2bc + ab^2c + 2ab^3 - 3a^2bc - 4ab^3 + 3 =$

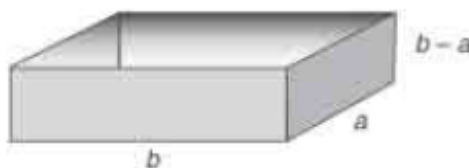
50. $(x + 1)(x^2 + 2x - 3) =$

58. $(2a^2 + ab + b^2)(3a - b^2 + 1) =$

82. Find the surface area and the volume of the open-top box below.

Surface Area =

Volume =



Section 1.4 (Factoring)

page 38: Problems 2, 9, 11, 12, 13, 32, 40 “ Factor completely...”

2. $\frac{1}{4}x + \frac{3}{4}y =$

9. $3x^2 + 6x^2y - 9x^2z =$

11. $x^2 + 4x + 3 =$

13. $y^2 - 8y + 15 =$

32. $2x^2 + 7x + 6 =$

40. $9y^2 - 16x^2 =$

HOMEWORK 2., continued

Section 1.5 (Rational Expressions)

Page 47: Problems 1, 2, 7, 8, 25, 32, 51, 52

1.	$\frac{x+4}{x^2-16}$	2.	$\frac{y^2-25}{y+5}$	7.	$\frac{2}{3x-6} \div \frac{3}{2x-4}$	8.	$\frac{5x+15}{8} \div \frac{3x+9}{4}$
25.	$\frac{2b}{b-1}, \frac{3}{(b-1)^2}$	32.	$\frac{x}{x^2-4} + \frac{2}{4-x^2}$	51.	$\frac{1+\frac{2}{x}}{1-\frac{3}{x}}$	52.	$\frac{x-\frac{1}{x}}{2+\frac{1}{x}}$

Section 1.7 (Rational Exponents and Radicals)

Page 67: Problems 1, 5, 6, 19, 20

In Exercises 1–12, simplify, and write the answer using only positive exponents.

1.	$16^{3/4}$	5.	$\frac{2x^{1/3}}{x^{-3/4}}$	6.	$\frac{y^{-2/3}}{y^{1/5}}$
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In Exercises 19–24, write the expression in exponent form.

19. $\sqrt[4]{8^3}$

20. $\sqrt[5]{3^2}$

Section 1.6 (Rational Exponents and Radicals) Page 57: Problems 1, 5, 6, 19, 20

1.	$x^2 \cdot x^4 = x^8$	5.	$(2x)^4 = 2x^4$	6.	$\left(\frac{4}{3}\right)^4 = \frac{4}{3^4}$
19.	$\frac{x^n}{x^{n+2}}$	20.	$\left(\frac{3x^3}{y^2}\right)^5$		

HOMEWORK 3.**Chapter 1 Review** pages 79-82: Problems 17, 22, 26, 78

17. A salesperson receives $3.25x + 0.15y$ dollars, where x is the number of hours worked and y is the number of miles driven. Find the amount due the salesperson if $x = 12$ hours and $y = 80$ miles.

In Exercises 21–23, perform the indicated operations.

22. $x(2x-1)(x+2) =$

26. In Exercises 24–29, factor each expression.

$$2a^2 + 3ab + 6a + 9b =$$

78. The irrational number called the golden ratio

$$T = \frac{\sqrt{5} + 1}{2}$$

has properties that have intrigued artists, philosophers, and mathematicians through the ages. Show that T satisfies the identity

$$T = 1 + \frac{1}{T} \quad (\text{use } T \text{ value above and solve...})$$

Section 2.1 (Linear Equations in One Unknown); pages 93-94:

Problems 5, 6, 7, 13, 25, 26, 31, 33

In Exercises 5–24, solve the given linear equation and check your answer.

5. $3x + 5 = -1$

6. $5r + 10 = 0$

7. $2 = 3x + 4$

13. $-5x + 8 = 3x - 4$

Solve for x in Exercises 25–28.

25. $kx + 8 = 5x$

26. $8 - 2kx = -3x$

Solve and check in Exercises 29–44.

31. $\frac{2}{x} + 1 = \frac{3}{x}$

33. $\frac{2y - 3}{y + 3} = \frac{5}{7}$

HOMEWORK 3., *continued***Section 2.2 (Applications) pages 103-104 (page 94 in 5th Ed.):**

Problems 1, 2, 3, 4, 5, 7, 11, 12

In Exercises 1–3, **let n represent the unknown.** Translate from words to an algebraic expression or equation.

- 1. The number of blue chips is 3 more than twice the number of red chips.**
- 2. The number of station wagons on a parking lot is 20 fewer than 3 times the number of sedans.**
- 3. Five less than 6 times a number is 26.**

In Exercises 4–41, **Translate from words to an algebraic problem and solve.**

- 4. Janis is 3 years older than her sister. Thirty years from now the sum of their ages will be 111. Find the current ages of the sisters.**
 - 5. John is presently 12 years older than Fred. Four years ago John was twice as old as Fred. How old is each now?**
 - 7. Find three consecutive integers whose sum is 21**
 - 11. A 12-meter long steel beam is to be cut into two pieces so that one piece will be 4 meters longer than the other. How long will each piece be?**
 - 12. A rectangular field whose length is 10 meters longer than its width is to be enclosed with exactly 100 meters of fencing material. What are the dimensions of the field?**
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HOMEWORK 4.

Reading assignment: Textbook sections corresponding to the homework assignments

Section 2.2 (Applications)

pages 105-106: Problems 25, 28, 34, 42 through 49

25. Professors Roberts and Jones, who live 676 miles apart, are exchanging houses and jobs for the summer. They start out for their new locations at exactly the same time, and they meet after 6.5 hours of driving. If their average speeds differ by 4 mph, what are their average speeds?

28. How many pounds of raisins worth \$3 per pound must be mixed with 10 pounds of peanuts worth \$2.40 per pound to produce a mixture worth \$2.80 per pound?

34. If $1/3$ is subtracted from 3 times the reciprocal of a certain number, the result is $25/6$. Find the number.

In Exercises 42–51 solve for the indicated variable in terms of the remaining variables.

42. $A=Pr$ for r

43. $C=2\pi r$ for r

44. $V=1/3 (\pi r^2 h)$ for h

45. $F= 9/5 (C) + 32$ for C

46. $S= 1/2 gt^2 + vt$ for v

47. $A= 1/2 h(b+b')$ for b

48. $A=P(1+rt)$ for r

49. $1/f = 1/f_1 + 1/f_2$ for f_2

HOMEWORK 4., continued**Section 2.3 (The Quadratic Equation)**

pages 122-123: Problems 3, 4, 16, 18, 25, 26, 28, 37, 40, 50, 52

In Exercises 1–14, solve by factoring.

3. $x^2 + x - 2 = 0$

4. $3r^2 - 4r + 1 = 0$

In Exercises 15–24, solve the given equation.

16. $4x^2 - 64 = 0$

18. $6x^2 - 12 = 0$

In Exercises 25–36, solve by completing the square.

25. $x^2 - 2x = 8$

26. $t^2 - 2t = 15$

28. $9x^2 + 3x = 2$

In Exercises 37–48, solve by the quadratic formula.

37. $2x^2 + 3x = 0$

40. $2x^2 - 3x - 2 = 0$

In Exercises 49–58, solve by any method.

50. $2t^2 + 2t + 3 = 0$

52. $x^2 + 2x = 0$

HOMEWORK 5.

Reading assignment: Textbook sections corresponding to the homework assignments

Section 2.4 (Applications of Quadratic Equations)

pages 128-129: Problems 1, 4, 5, 6, 8, 11, 12, 21*

1. Working together, computers A and B can complete a data-processing job in 2 hours. Computer A working alone can do the job in 3 hours less than computer B working alone. How long does it take each computer to do the job by itself?

4. A 16-inch by 20-inch mounting board is used to mount a photograph. How wide a uniform border is needed if the photograph occupies $\frac{3}{5}$ of the area of the mounting board?

5. The length of a rectangle exceeds twice its width by 4 feet. If the area of the rectangle is 48 square feet, find the dimensions.

6. The length of a rectangle is 4 centimeters less than twice its width. Find the dimensions if the area of the rectangle is 96 square centimeters.

8. The base of a triangle is 2 feet more than twice its altitude. If the area is 12 square feet, find the dimensions.

11. The sum of a number and its reciprocal is $\frac{26}{5}$ – Find the number.

12. The difference of a number and its reciprocal is $\frac{35}{6}$ Find the number.

21. A wire 48 centimeters long is cut into two pieces. Each piece is bent to form a square. Where should the wire be cut so that the sum of the areas of the squares is equal to 80 square centimeters?

HOMEWORK 6.**Section 2.2 (Words to Algebra)****pages 106-107: Problems 52, 53, 54, 55, 56, 57, 62, 63, 64, 65****Translate the following from words to an algebraic expression or equation, denoting the unknown by n .****52a.** The express train travels 5 mph faster than the local train.**52b.** The length of a rectangle is 7 inches more than its width.**52c.** The area of a triangle, if the altitude is twice the base**52d.** The sum of 3 consecutive even numbers**52e.** 15% of the amount by which a number exceeds 10,000**If r and s represent two numbers, write the following:****53a.** Twice the sum of the two numbers**53b.** 5% of the difference between the two numbers**53c.** 5 less than twice the second number**53d.** the ratio of the first to the second number**53e.** the sum of the squares of the two numbers**53f.** the average of the two numbers**53g.** 6 times the first number less 4 times the second number**54.** Write formulas for each of the following:**54a.** The charge in cents for a telephone call between two cities lasting n minutes, n greater than 3, if the charge for the first 3 minutes is \$1.20 and each additional minute costs 33 cents.**54b.** the taxi fare for m miles, if the initial charge is \$2.50 and the driver charges 70 cents for every $1/5$ mile traveled.**54c.** The amount in an account at the end of a year, if simple interest is paid at the rate of 16%, and the account contains d dollars at the beginning of the year.

HOMEWORK 6., continued

54d. The fine a company paid for dumping acid into the Mississippi River for d days, if the U.S. Environmental Protection Agency fined the company \$150,000 plus \$1000 per day until the company complied with the federal water pollution regulations.

55. Find three consecutive even numbers such that twice the first plus 3 times the second is 4 times the third.

56. When exercising, Mary walks a distance to warm up, jogs $3\frac{1}{2}$ times as far as she walks, and sprints $3\frac{1}{3}$ times as far as she jogs. If she covers 4171 meters, find the distances that she walked, jogged, and sprinted.

57. A 10-quart radiator has 30% antifreeze. How much of the fluid should be drained and replaced with pure antifreeze to double the strength of the mixture?

In Exercises 62–65, solve for the indicated variable:

62. Solve for n :
$$I = \frac{E}{R + \frac{R}{n}}$$

63. Solve for w :
$$Wf = \left(\frac{W}{k} - 1\right)\left(\frac{1}{k}\right)$$

64. Solve for r :
$$W = \frac{2PR}{R - r}$$

65. Solve for r :
$$\frac{E}{c} = \frac{R + r}{r}$$

Section 2.3 (Quadratic Equation)

pages 123-124: Problems 85, 86, 89, 101*

Be sure to check your answers to problems 85, 86, and 89 to reject extraneous solutions (solutions that don't satisfy the original equation).

In Exercises 85–92, Find the solution set.

85. $x + \sqrt{x+5} = 7$

86. $x - \sqrt{13-x} = 1$

89. $\sqrt{3x+4} - \sqrt{2x+1} = 1$

In Exercises 101 and 102, provide a proof of the following statements.

101.* If r_1 and r_2 are the roots of the equation: $ax^2 + bx + c = 0$

101a. Prove: $r_1 r_2 = c/a$

101b. Prove: $r_1 + r_2 = - b/a$ (*Note there is an error in the text)

Some on-line sites to help you learn algebra and trigonometry

On-line tutoring program:

<http://tutorial.math.lamar.edu/Classes/Alg/Alg.aspx>

Students should print out this set of the rules of algebra

http://tutorial.math.lamar.edu/pdf/Algebra_Cheat_Sheet.pdf

Students should print out this set of the rules trigonometry

http://tutorial.math.lamar.edu/pdf/Trig_Cheat_Sheet.pdf

Good list of the most common mistakes made by algebra students

<http://mathmistakes.info/mistakes/algebra/>

Another good web site:

<http://www.algebrahelp.com/>