

COLLEGE ALGEBRA

CHAPTER 1 EQUATIONS & INEQUALITIES

****CHECK ODD ANSWERS IN THE BACK OF THE BOOK****

1.1 Linear Equations

- Basic terminology
- Solving linear equations
- Identities, conditional equations, & contradictions
- Literal Equations (solving for a variable)

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MINI-QUIZ 1.1

1.2 Applications & Modeling with Linear Equations

- Solving applied problems
- Geometry, motion, work-rate, mixture, and modeling

page 100-107 #8-16 even, 17, 20-24, 29-33, 38-40

geometry formulas in back of book

MINI-QUIZ 1.2

QUIZ 1.1-1.2

1.3 Complex Numbers

- Basic concepts
- Operations on complex numbers

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MINI-QUIZ 1.3

1.4 Quadratic Equations

- Solving quadratic equations
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- Solving for a specified variable
- Discriminant

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MINI-QUIZ 1.4

1.5 Applications & Modeling with Quadratic Equations

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- Height of an object
- Modeling with quadratic equations

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MINI-QUIZ 1.5

QUIZ 1.3-1.5



TURN OVER

COLLEGE ALGEBRA

CHAPTER 1 EQUATIONS & INEQUALITIES

****CHECK ODD ANSWERS IN THE BACK OF THE BOOK****

1.6 Other Types of Equations

- Rational equations
- Equations with radicals
- Equations in quadratic form

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MINI-QUIZ 1.6

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- Linear inequalities
- Three part inequalities
- Quadratic inequalities
- Rational inequalities

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MINI-QUIZ 1.7

1.8 Absolute Value Equations & Inequalities

- Absolute value equations and inequalities

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CHAPTER TEST (problems to consider for practice)

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CHAPTER 1 EQUATIONS AND INEQUALITIES

Section 1.1 Linear Equations

Solve each equation.

1. $7x + 9 = 3x - 7$

2. $-5x + 2 = -7x + 10$

3. $3(2 - 7x) = 1 - 2(9x + 5)$

4. $3(x - 8) - 5x + 6 = -4 - (4 - 3x)$

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

6. $\frac{2}{3}x - \frac{3}{8} = \frac{1}{6}x + \frac{5}{12}$

7. $4[5x - (3 - 8x) + 6x] = -x - 5$

8. $\frac{4}{9}(5x - 1) = \frac{9x - 3}{4}$

9. $.8x - .3 = .3x + .9$

10. $.23x + .27 = .78x + .05$

11. $7(2x - 5) + 15x = 5(9x - 7) + 87x$

12. $\frac{1}{6}x + 2.4 = \frac{6}{5}x - .7$

13. $\frac{3}{8}x + .13x - 6 = \frac{1}{12}x + \frac{13}{40}$

14. $.03x + .02(x - 18) = 1.84$

Decide whether each equation is an identity, a conditional equation, or a contradiction. Give the solution set.

15. $3(2 - x) + 4x = 5x + 2(1 - 2x)$

16. $12(x - 3) + 2 = 6(x - 4) + 6x - 10$

17. $2(x + 1) + 3(x + 2) = 3(x + 1) + 2(x + 2)$

18. $7x - (x + 7) = 6x - (5x + 7)$

19. $.7(x + 3) - 4(x + 8) = .3(x + 7) - .8(x + 4)$

20. $7(x - 2) = 2(x - 12) + 5(x + 2)$

Solve each formula for the indicated variable. Assume that the denominator is not 0 if variables appear in the denominator.

21. $V = lwh$ for w (volume of a rectangular box)

22. $P = 2l + 2w$ for w (perimeter of a rectangle)

23. $A = \frac{1}{3}Bh$ for h (volume of a pyramid)

24. $E = \frac{1}{2}mv^2$ for m (kinetic energy)

25. $S = 2w^2 + 4wh$ for h (surface area of a rectangular box with a square base)

26. $S = lw + wh + 2hl$ for l (surface area of a rectangular box with an open top)

Solve each equation for x .

27. $3(x - 2a) + 2b = x - a$

28. $bx - 2a = a(x - 3)$

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

$$\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

$$\frac{1}{4} + \frac{1}{5} = \frac{5}{20} + \frac{4}{20} = \frac{9}{20}$$

$$\frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$$

$$\frac{3}{5} + \frac{1}{10} = \frac{6}{10} + \frac{1}{10} = \frac{7}{10}$$

The second section covers the process of reconciling accounts. It involves comparing the internal records with the bank statements to identify any discrepancies. This step is crucial for ensuring that the financial statements are accurate and free from errors.

In the third part, the author discusses the impact of inflation on the value of money over time. It explains how the purchasing power of a dollar today is significantly higher than it was in the past.

The fourth section provides a detailed analysis of the current economic conditions. It examines the factors contributing to the growth rate and discusses the challenges faced by the government in managing the economy.

The fifth part of the document focuses on the role of the central bank in maintaining financial stability. It discusses the various tools and policies used to control the money supply and interest rates.

The sixth section explores the relationship between the government and the private sector. It highlights the importance of a strong regulatory framework to ensure fair competition and protect consumers.

Finally, the document concludes with a summary of the key findings and recommendations. It stresses the need for continued vigilance and reform to ensure a sustainable and prosperous future for the nation.

29. $\frac{2x}{a+3} = x-3$

30. $\frac{x}{2x-1} = b$

31. $bx+8 = a^2x-1$

32. $-2x = (5x-3)(2m+3)$

Work each problem.

33. Amy borrowed \$1600 from the bank. She agrees to repay the money in 3 months with simple interest of 8.5%.
- How much will the interest amount to?
 - How much must she pay the bank in 3 months?
34. Barry borrowed \$2340 from a friend. He agreed to repay his friend in 9 months with simple interest at 4%.
- How much must Barry pay his friend at the end of 9 months?
 - How much of the amount in part a is interest?

To convert between degrees Celsius and degrees Fahrenheit we use the equations $C = \frac{5}{9}(F - 32)$ and $F = \frac{9}{5}C + 32$.
In each exercise, convert to the other system. Round answers to the nearest tenth of a degree if necessary.

35. 28°C

36. 2°C

37. 44°F

38. 1000°F

Section 1.2 Applications and Modeling with Linear Equations

Solve each problem.

39. A television is on sale for 15% off. The sale price is \$204. What was the original price?
40. Leona needs a rectangular storage shed. She wants the length to be 2 ft more than the width, and the perimeter must be 24 ft. Find the length and width of the shed.
41. The perimeter of a triangle is 48 in. The length of the longest side is 5 in shorter than twice the length of the shortest side. The length of the third side is 2 in less than the length of the longest side. Find the lengths of the three sides of the triangle.
42. A rectangle has length 4 cm longer than the width. If we increased the width by 2 cm and we decreased the length by 1 cm, the resulting rectangle would have a perimeter of 22 cm. Find the dimensions of the original rectangle.
43. A rectangular box has a length of 5 in, a width of 2 in, and a surface area of 48 sq. in. Find the height.
44. Carol can drive to her job in 30 min. The trip home takes 50 min due to traffic. If Carol's rate is 6 mph slower on the return trip, how far does she live from her job?
45. Doug can jog from his apartment to Rachel's in 30 min. Rachel can ride her bike the same distance in 9 min. If Rachel's rate is 7 mph faster than Doug's, how far is it from Doug's apartment to Rachel's?

46. Jill starts jogging at a speed of 4 mph. Jason begins jogging at the same place Jill started 20 min later. Jason jogs in the same direction as Jill at a speed of 6 mph. How long will it take Jason from the time he starts jogging to catch up to Jill?
47. Emily and Fran live 38 mi apart. At 2:00 P.M. Emily starts walking to Fran's house at 4 mph. Fran leaves 20 minutes later and begins jogging towards Emily's house at 6 mph. Find the time when they will meet.
48. It took Georgia 4 hours to travel upstream in her boat. The return trip with the current took only 2 hours. If the speed of the boat in still water was 6 mph, find the speed of the current.
49. If Harry can paint a room in 4 hr and Sarah can paint the same room in 3 hr, how long does it take them to do it together?
50. A water tank can be filled by one pipe in 7 hr, by another pipe in 10 hr. If the first pipe is opened for 3 hr and then the second pipe is opened, how long will it take to fill the tank?
51. A pipe can fill a swimming pool in 4 hr but a drain can empty the pool in 9 hr. How long will it take to fill the pool with the drain open?
52. In 2 hr, two computers working together can schedule classes for the college that Sandra attends. The newer computer takes 3 hr working alone to do the job. How long does it take the other computer to do the job alone?
53. How many gallons of a 2% acid solution must be mixed with 7 gal of a 20% solution to obtain a 17% solution?
54. How many liters of pure alcohol should be mixed with 4 L of 18% alcohol to get a mixture that is 36% alcohol?
55. How much water must be added to 12 mL of a 10% saline solution to reduce the concentration to 4%?
56. How much water must be evaporated from 20 L of a 10% saline solution to obtain a 50% saline solution?
57. A tank holds 80 liters of a chemical solution. Currently the solution has a strength of 10%. How much of this should be drained and replaced with an 50% solution to have a final strength of 20%?
58. Irene wishes to sell a piece of property for \$180,000. She wants the money to be paid off in two ways – a short-term note at 5% interest and a long-term note at 4.5% interest. Find the amount of each note if the total annual interest paid is \$8300.
59. Horace invested some money at 4% and four times as much at 5%. His total annual income from the two investments is \$48. Find the amount invested at each rate.
60. Janet won \$300,000 in a state lottery. She first paid income tax of 35% on the winnings. Of the rest, she invested some at 1.5% and some at 2%. Find the amount invested at each rate if she earned \$3690 in total interest for one year.
61. The linear model $y = .2145x + 15.69$ is used to give a projection of the approximate total enrollment, in millions, in degree-granting institutions from fall 2003 to fall 2012 where $x = 0$ corresponds to 2003, $x = 1$ to 2004, and so on, and y is in millions of students.
 - a. Use the model to determine projected enrollment for fall 2006.
 - b. Use the model to determine the year in which enrollment is projected to reach 16.8 million.
62. Martin is currently three times as old as Marilyn. In 19 years, Martin will be twice as old as Marilyn. How old are Martin and Marilyn now?

63. Oscar is twice as old as Olivia. 16 years ago, Oscar was four times as old as Olivia. How old are Oscar and Olivia now?
64. Patricia has grades of 86, 85, and 93 on her first three tests. What grade does she need on her fourth test to average 90?
65. Quentin has grades of 88, 79, and 89 on his first three tests. If his final exam score is to be counted as two test grades in determining his course average, what grade must he make on his final exam to give him an average of 90?
66. In a certain triangle, the second angle measures 12° less than four times the first angle, and the third angle measures 8° more than twice the second angle. What are the measures of the angles?

Section 1.3 Complex Numbers

Identify each number as real, complex, or pure imaginary. (More than one of these descriptions may apply.)

67. $2 + 3i$

68. $-5i$

69. $-\pi$

70. 15

71. $\sqrt{-3}$

72. $1 + \sqrt{-1}$

Write each number as a product of a real number and i .

73. $\sqrt{-144}$

74. $\sqrt{-32}$

75. $\sqrt{-375}$

76. $-\sqrt{-90}$

Multiply or divide as indicated. Simplify each answer.

77. $\sqrt{-12} \cdot \sqrt{-12}$

78. $\sqrt{-10} \cdot \sqrt{-14}$

79. $\sqrt{-30} \sqrt{-6}$

80. $\frac{\sqrt{-40}}{\sqrt{-4}}$

81. $\frac{\sqrt{-72}}{\sqrt{24}}$

82. $\frac{\sqrt{-18}}{\sqrt{-60}}$

83. $\frac{\sqrt{-3} \sqrt{-7}}{\sqrt{6}}$

84. $\frac{\sqrt{35} \sqrt{-21}}{\sqrt{5}}$

Write each number in standard form $a + bi$.

85. $\frac{6 - \sqrt{-27}}{3}$

86. $\frac{4 + \sqrt{-20}}{2}$

87. $\frac{6 + \sqrt{-45}}{12}$

88. $\frac{15 - \sqrt{-150}}{20}$

Find each sum or difference. Write the answer in standard form.

89. $(1+5i)+(8-3i)$

90. $(-7+i)+(-9-2i)$

91. $(6+3i)-(6-4i)$

92. $(-2+8i)-(-1-10i)$

93. $(5+5i)-(2+7i)-(15-2i)$

94. $-3i+(2-6i)-5-(4-12i)$

Find each product. Write the answer in standard form.

95. $(1+5i)(3-i)$

96. $(3+i)(9+i)$

97. $(7-9i)(-3-8i)$

98. $(4-2i)^2$

99. $(2+5i)(2-5i)$

100. $(\sqrt{17}+5i)(\sqrt{17}-5i)$

101. $(-2-3i)(-2+3i)$

102. $3i(3+5i)(3-5i)$

103. $-i(6+5i)^2$

104. $(7+i)(7-i)(1+4i)$

Simplify each power of i .

105. i^{41}

106. i^{43}

107. i^{200}

108. i^{-7}

109. $\frac{1}{i^{-17}}$

110. $\frac{1}{i^3}$

Find each quotient. Write the answer in standard form.

111. $\frac{2+3i}{1+i}$

112. $\frac{7-i}{7+i}$

113. $\frac{31+29i}{7-2i}$

114. $\frac{2-5i}{1+4i}$

115. $\frac{9}{i}$

116. $\frac{7}{-i}$

117. $\frac{14}{7i}$

118. $\frac{-2}{5i}$

Solve each problem.

119. Evaluate $4z - z^2$ if $z = -1 + 3i$.

120. Evaluate $z^3 + 4z$ if $z = -2i$.

Section 1.4 Quadratic Equations

Solve each equation by the zero-factor property.

121. $x^2 + 7x + 10 = 0$

122. $12x^2 - 7x - 12 = 0$

123. $2x^2 - 9x = -10$

124. $-3x^2 + 11x = -20$

Solve each equation by the square root property.

125. $x^2 = 81$

126. $x^2 = 72$

127. $x^2 = -25$

128. $x^2 = -40$

129. $(x-7)^2 = 18$

130. $(x-3)^2 = -9$

131. $(5x+2)^2 = -7$

132. $(6x-5)^2 = -24$

Solve each equation by completing the square.

133. $x^2 - 8x + 15 = 0$

134. $3x^2 - 5x - 2 = 0$

135. $x^2 - 4x - 1 = 0$

136. $x^2 + 7x - 2 = 0$

137. $2x^2 + 4x - 5 = 0$

138. $x^2 + 6x + 10 = 0$

139. $-3x^2 + x + 1 = 0$

140. $4x^2 + 8x + 5 = 0$

141. $4x^2 + 4x = 1$

142. $4x^2 + 4x = -3$

Solve each equation using the quadratic formula.

143. $x^2 + 3x - 1 = 0$

144. $x^2 - 2x = 6$

145. $x^2 = 6x - 5$

146. $x^2 = 3x - 7$

147. $6x^2 = 7x + 4$

148. $\frac{2}{3}x^2 + \frac{5}{6}x + 2 = 0$

149. $\frac{1}{2}x^2 - \frac{3}{5}x = 2$

150. $.2x^2 - .7x + .9 = 0$

151. $1 + \frac{2}{x} + \frac{3}{x^2} = 0$

152. $4 - \frac{3}{x} - \frac{4}{x^2} = 0$

Solve each cubic equation.

153. $x^3 + 125 = 0$

154. $x^3 - 216 = 0$

155. $8x^3 - 1 = 0$

156. $8x^3 + 27 = 0$

Solve each equation for the indicated variable. Assume no denominators are 0.

157. $E = \frac{1}{2}mv^2$ for v

158. $F = \frac{kqr}{s^2}$ for s

159. $S = 4\pi r^2 + 2\pi rh$ for r

160. $S = 2w^2 + 4wh$ for w

161. $2x^2 + xy - 3y^2 = 9$ for x

162. $2x^2 + xy - 3y^2 = 9$ for y

Evaluate the discriminant for each equation. Then use it to predict the number of distinct solutions, and whether they are rational, irrational, or nonreal complex. Do not solve the equation.

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

164. $10x^2 + 11x - 8 = 0$

165. $4x^2 + 6x + 9 = 0$

166. $25x^2 + 40x + 16 = 0$

167. $9x^2 = 32x + 12$

168. $16x^2 + 9 = 0$

For each pair of numbers, find the values of a , b , and c for which the quadratic equation $ax^2 + bx + c = 0$ has the given numbers as solutions. (Hint: Use the zero-factor property in reverse.)

169. 3, 8

170. $\sqrt{5}, -\sqrt{5}$

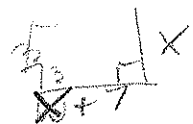
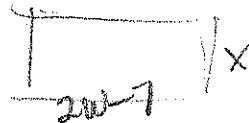
171. $2i, -2i$

172. $2 + i, 2 - i$

Section 1.5 Applications and Modeling with Quadratic Equations

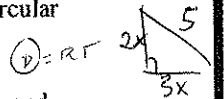
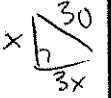
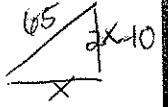
Solve each problem.

173. A rectangular room has an area of 400 sq. ft. The length is 7 ft less than twice the width. Find the dimensions of the room.
174. A farmer has 200 yd of fencing that she will use to enclose three sides a rectangular piece of land that lies next to a river. The river will be the fourth side. Find the dimensions of a piece of land that has an area of 3200 yd². (Two solutions are possible).
175. A rectangular rug is to fit in a room so that a border of uniform width is left on all four sides. If the room is 12 ft by 14 ft and the area of the rug is 80 sq. ft, how wide will the border be?
176. Raquel has a fish pond 12 ft by 16 ft. She wants to put grass in a strip of uniform width around the pond. She has enough grass seed for 93 sq ft. How wide will the strip be?
177. A piece of plastic in the shape of a rectangle has a length 7 inches more than the width. A square 3 inches on a side is cut from each corner and the sides turned up to form an open box with a volume of 360 in³. Find the dimensions of the original piece of plastic.
178. A cylindrical can has a height of 10 in and a surface area of 78π in². Find the radius of the can.
179. What is the length of the side of a square if its area is numerically equal to four times its perimeter?



$$78\pi =$$

180. A rectangle has an area that is numerically 1 more than its perimeter. If the length is 1 more than twice the width, what are its dimensions?
181. A kite is flying on 65 ft of string. Its vertical distance from the ground is 10 ft less than twice its horizontal distance from the person flying it. Assuming that the string is being held at ground level, find its horizontal distance from the person and its vertical distance from the ground.
182. A piece of land is in the shape of a right triangle. The longer leg is 1 yd longer than the short leg, and the hypotenuse is 8 yd longer than the longer leg. Find the lengths of all three sides.
183. A wire frame is in the shape of a right triangle with a hypotenuse of length 30 cm. One of the legs is three times as long as the other. To the nearest tenth of a cm, what is the length of the shortest leg?
184. A square lawn has an area of 1225 ft^2 . A sprinkler placed at the center of the lawn sprays water in a circular pattern that just covers the lawn. To the nearest tenth of a foot, what is the radius of the circle?
185. Tanya and Terrence each leave their friend Alan's house at the same time. Tanya walks north at 2 mph and Terrence walks east at 3 mph. How long after they leave will they be 5 miles apart? Round your answer to the nearest minute.
186. A projectile is launched from ground level with an initial velocity of v_0 feet per second. Neglecting air resistance, its height t seconds after launch in feet is given by $s = -16t^2 + v_0t$. Round answers to the following questions to the nearest hundredth if necessary:
- Find the time(s) that the projectile will reach a height of 100 ft if $v_0 = 89$.
 - Find the time it takes the projectile to return to the ground if $v_0 = 89$.
 - Find the time(s) that the projectile will reach a height of 124 ft if $v_0 = 89$.
 - Find the time(s) that the projectile will reach a height of 90 ft if $v_0 = 78$.
 - Find the time it takes the projectile to return to the ground if $v_0 = 78$.
187. The average cost for tuition and fees at public colleges from 1990 – 2002, in dollars, can be modeled by the equation $y = 18.34x^2 + 512.9x + 9314$, where $x = 0$ corresponds to 1990, $x = 1$ to 1991, and so on. Based on this model, for what year was the cost \$13,100?
188. The number of U.S. households estimated to see and pay at least one bill on-line each month during the years 2000 through 2006 can be modeled by the equation $y = .808x^2 + 2.625x + .502$, where $x = 0$ corresponds to the year 2000, $x = 1$ corresponds to 2001, and so on, and y is in millions. Approximate the number of households expected to pay at least one bill on-line each month in 2006.
189. An apartment complex has 90 units. If the monthly rent were \$420, all the units would be rented. For each \$15 increase in rent one additional unit will remain vacant. Currently the revenue from the complex is \$52,215. How many apartments are rented?
190. A club is arranging a charter flight to Boston. The cost of the trip is \$150 each for 60 passengers, with a refund of \$2 per passenger for each passenger in excess of 60. How many passengers must take the flight to produce a revenue of \$8800?



Section 1.6 Other Types of Equations

Decide what values of the variable cannot possibly be solutions for each equation. Do not solve.

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

192. $\frac{2}{x} + \frac{7}{x+5} = \frac{1}{x^2+5x}$

Solve each equation.

193. $\frac{5x+7}{8} + \frac{2x}{x+5} = x$

194. $\frac{x}{x-5} = \frac{5}{x-5} + 2$

195. $\frac{4}{x-2} - \frac{7}{x+2} = \frac{16}{x^2-4}$

196. $\frac{2}{x-6} + \frac{3}{x+6} = \frac{24}{x^2-36}$

197. $\frac{3}{x^2+7x+10} - \frac{1}{x^2-25} = \frac{1}{x^2-3x-10}$

198. $\frac{2}{x} - \frac{1}{x+6} = \frac{7}{x^2+6x}$

199. $\frac{x}{x+5} + \frac{1}{x-5} = \frac{10}{x^2-25}$

200. $\frac{4}{x-2} - \frac{7}{x+2} = \frac{10}{x^2-4}$

201. $\frac{6}{x^2} - \frac{17}{x} = -12$

202. $\frac{12}{x^2} + \frac{5}{x} = 3$

203. $\frac{17}{3x-1} + \frac{6}{(3x-1)^2} = 3$

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

205. $\frac{9x}{x-3} = \frac{5x^2}{x-3} + 12$

206. $\frac{x}{2} + \frac{11x+8}{4x} = \frac{x-1}{2x}$

207. $x - \sqrt{3x+4} = 0$

208. $\sqrt{3x+1} = x-3$

209. $\sqrt{8x+9} - 3 = 2x-6$

210. $\sqrt{3x} - x + 6 = 0$

211. $\sqrt{x+2} - \sqrt{x} = 1$

212. $\sqrt{x+7} + 2 = \sqrt{x-1}$

213. $\sqrt{2x+7} = \sqrt{x+12} - 2$

214. $\sqrt{5x} = \sqrt{2x+9} + 3$

215. $\sqrt{3x+4} = 4 + \sqrt{x-6}$

216. $\sqrt{2\sqrt{x+5}} = \sqrt{3x+7}$

217. $2 + \sqrt{x} = \sqrt{7+6\sqrt{x}}$

218. $\sqrt[3]{7x+5} = \sqrt[3]{5x+9}$

219. $\sqrt[3]{6x^2-10x+3} - \sqrt[3]{x} = 0$

220. $(3x+5)^{1/3} - (4x-3)^{1/3} = 0$

221. $\sqrt[3]{3x+7} = 4$

222. $\sqrt[4]{x^2+8x} = \sqrt[4]{20}$

223. $(x^2 + 15x)^{1/4} = 2$

224. $3x^4 - 25x^2 + 8 = 0$

225. $x^4 + 3x^2 - 4 = 0$

226. $(6x-1)^{2/3} = x^{1/3}$

227. $(x-4)^{2/5} = (2x)^{1/5}$

228. $x^{2/5} = 3x^{1/5}$

229. $x^{3/4} = 2x^{1/2}$

230. $(2x+3)^{2/3} - 2(2x+3)^{1/3} - 8 = 0$

231. $(x+3)^{4/3} - 13(x+3)^{2/3} + 36 = 0$

232. $5(x+1)^4 - 3(x+1)^2 = 2$

233. $3x^{-2} - 13x^{-1} + 4 = 0$

234. $x^{-2/3} - 3x^{-1/3} - 28 = 0$

Solve each equation for the indicated variable. Assume all denominators are nonzero.

235. $b = 2\sqrt{cd}$ for d

236. $x^{2/3} - y^{2/3} = a^{2/3}$ for y

237. $\frac{1}{c} = \frac{1}{a} - \frac{1}{b}$ for b

238. $\frac{r+s}{r-s} = \frac{u}{v}$ for r

Section 1.7 Inequalities

Solve each inequality. Write each solution set in interval notation and graph it.

239. $4x + 7 \leq 23$

240. $-5x + 2 \geq -8$

241. $3 - (7x - 2) > 2x - 22$

242. $3(5x - 1) - 1 \leq 15x - 4$

243. $\frac{3x+1}{-4} < 2x+3$

244. $\frac{3}{4}x + \frac{1}{5}x - \frac{3}{10}(x-4) \leq \frac{3}{2}$

245. $3 < 8 + 5x < 18$

246. $-7 \leq 3x - 1 \leq 17$

247. $-4 > -x + 8 > -14$

248. $-3 \leq \frac{2x-3}{5} \leq -2$

249. $-1 < \frac{x+5}{-3} \leq 6$

250. $2 \leq \frac{3x-8}{-2} < 3$

Find all intervals where each product will at least break even.

251. The cost to produce x units of computers is $C = 500x + 18000$, while the revenue is $R = 800x$.

252. The cost to produce x units of glasses is $C = 20x + 1000$, while the revenue is $R = 70x$.

Solve each quadratic inequality. Write each solution set in interval notation.

253. $x^2 + 3x - 18 < 0$

254. $3x^2 - 10x - 8 \geq 0$

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255. $x^2 + 9x + 20 > 2$

256. $x(x-3) \leq 10$

257. $x^2 > 4$

258. $2x^2 + x - 3 < 0$

259. $x^2 + 3x + 5 > 0$

260. $x^2 + 2x + 4 < 0$

Solve each inequality. Write each solution set in interval notation.

261. $(2x+5)(x-1)(x-4) \leq 0$

262. $x^3 - 64x > 0$

263. $(x+2)^2(x-3) \leq 0$

264. $x^3 + 3x^2 - x - 3 \geq 0$

265. $x^2(x+5)^2 > 0$

266. $x^2(4x-1)^2 < 0$

Solve each rational inequality. Write each solution set in interval notation.

267. $\frac{x+1}{x+3} \geq 0$

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

269. $\frac{5}{x-3} \leq -1$

270. $\frac{10}{1-3x} \geq 1$

271. $\frac{1}{x-3} > 5$

272. $\frac{3}{x-4} < \frac{1}{x-4}$

273. $\frac{3}{x} \leq \frac{10}{3x+2}$

274. $\frac{1}{x-3} \geq \frac{4}{x+3}$

275. $\frac{2x+3}{3x+5} \leq 4$

276. $\frac{x-4}{x^2+4} \geq 0$

277. $\frac{(2x+6)^3}{(3x-6)^2} \leq 0$

278. $\frac{(x+6)(2x-5)}{(4x-1)^3} > 0$

Solve each problem.

279. The velocity of an object is given by $v = t^2 - 6t$ where t is time in seconds. Find the interval where the velocity is negative.

280. Use the discriminant to find the values of k for which $x^2 + kx + 5 = 0$ has two nonreal complex solutions.

Section 1.8 Absolute Value Equations and Inequalities

Solve each equation.

281. $|2x+8|=2$

282. $|7-4x|=3$

283. $\left|\frac{x-6}{3}\right|=5$

284. $\left|\frac{2}{3x+1}\right|=3$

285. $\left|\frac{3x+2}{2x-1}\right|=2$

286. $|3x+4|=|x+8|$

287. $|x-3|=|x-7|$

288. $|3x-9|=|9-3x|$

Solve each inequality. Give the solution set using interval notation.

289. $|x|\leq 7$

290. $|x|> 5$

291. $|4x-1|\leq 19$

292. $|5x-1|> 9$

293. $\left|x+\frac{3}{4}\right|<\frac{1}{2}$

294. $2|x-8|\geq 10$

295. $|1-3x|> 2$

296. $\left|\frac{1}{6}x-\frac{3}{2}\right|\leq\frac{2}{3}$

Solve each equation or inequality.

297. $|2x+5|-9=-1$

298. $|3-8x|-2=3$

299. $|2x+10|+8\leq 12$

300. $\left|3x-\frac{2}{3}\right|-2<7$

301. $|3-7x|+5\geq 8$

302. $|7x-18|\geq -4$

303. $|x+14|\leq -8$

304. $|5x+9|=0$

305. $|3.8x-3.8|<0$

306. $|8x-2|\leq 0$

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307. $|7x + 21| > 0$

308. $|x^2 - 5x| = 6$

309. $|x^2 + 8x + 12| = 0$

310. $|32x^3 - 2x| = 0$

311. $|x^2 + 3| = |4x|$

312. $|x^4 + 4| > 0$

Write each statement as an absolute value equation or inequality.

313. z is no less than 5 units from 2.

314. s is no more than 3 units from -5 .

315. k is within .03 unit of 1.

316. p is within .0001 unit of 25.

Solve each problem.

317. Suppose that $y = 4x + 3$ and we want y to be within .03 unit of 5. For what values of x will this be true?

318. Suppose that $z = 2x - 10$ and we want z to be within .001 unit of 7. For what values of x will this be true?