

To prepare you for next year's AP Pre-Calculus class, the Math Department requires that you complete a summer review assignment. This review will refresh your skills and concepts necessary to meet the challenges and prepare you for the variety of new concepts encountered in the AP Pre-Calculus course.

Solve each problem, showing all your work. You are expected to spend a minimum of 4 hours on this assignment, but it may require as many as 6 hours if you are not familiar with the material. ALL problems assigned below need to be solved, and all work must be shown neatly and stapled. The completed assignment is due on the first day of class. All problems in this review should be material you have already mastered in previous courses. If anything does not look familiar, please ensure you get the proper help during the summer. For a refresher on any of the assigned topics, please go to www.patrickjmt.com for review videos.

- P.1: Complete exercises pg. 9 #1-67 odd
- P.2: Complete exercises pg. 22 #17-43 odd
- P.3: Complete exercises pg. 33 #1-31 odd
- P.4: Complete exercises pg. 50 #1-45 odd
- P: P.3 Complete exercises pg. 68 #39-67 odd
- P: P.4 Complete exercises pg. 68/69 #69-113 odd
- P: P.5 Complete exercises pg. 69 #117-133 odd

Students will be given work related to these assignments the first week of school. We know that every student will have a much more enjoyable and productive school year if well prepared.

All students will be required to have a graphing calculator. Teachers will demonstrate using a TI-84+.

If you have any questions, you may reach out to the Math Department Chair, Mrs. Brand, at: cbrand@moreaucatholic.org

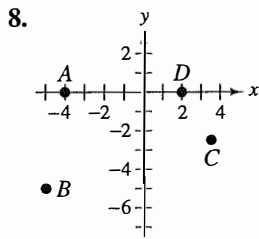
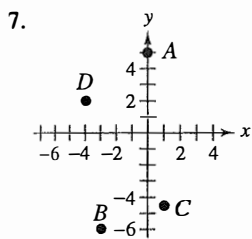
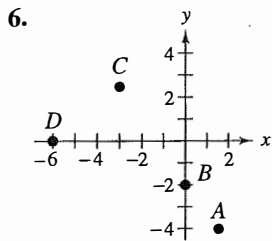
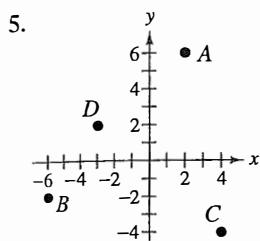
See you in August!

P.1 Exercises

In Exercises 1–4, sketch the polygon with the indicated vertices.

1. Triangle: $(-1, 1), (2, -1), (3, 4)$
2. Triangle: $(0, 3), (-1, -2), (4, 8)$
3. Square: $(2, 4), (5, 1), (2, -2), (-1, 1)$
4. Parallelogram: $(5, 2), (7, 0), (1, -2), (-1, 0)$

In Exercises 5–8, approximate the coordinates of the points.



In Exercises 9–12, find the coordinates of the point.

9. The point is located three units to the left of the y -axis and four units above the x -axis.
10. The point is located eight units below the x -axis and four units to the right of the y -axis.
11. The point is located five units below the x -axis and the coordinates of the point are equal.
12. The point is on the x -axis and twelve units to the left of the y -axis.

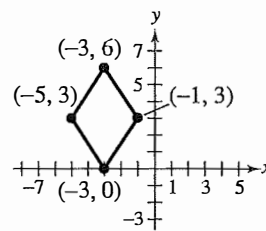
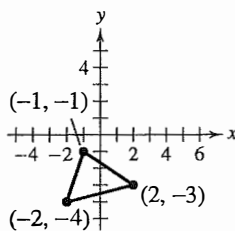
In Exercises 13–22, determine the quadrant(s) in which (x, y) is located so that the condition(s) is (are) satisfied.

13. $x > 0$ and $y < 0$
14. $x < 0$ and $y < 0$
15. $x = -4$ and $y > 0$
16. $x > 2$ and $y = 3$

17. $y < -5$
18. $x > 4$
19. $(x, -y)$ is in the second quadrant.
20. $(-x, y)$ is in the fourth quadrant.
21. $xy > 0$
22. $xy < 0$

In Exercises 23 and 24, the polygon is shifted to a new position in the plane. Find the coordinates of the vertices of the polygon in its new position.

23. Shift: 5 units up, 2 units to the right
24. Shift: 3 units down, 6 units to the right



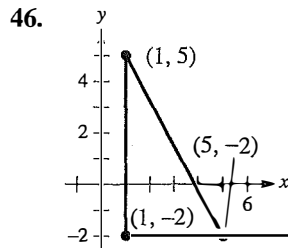
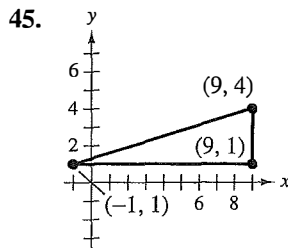
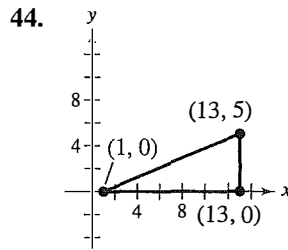
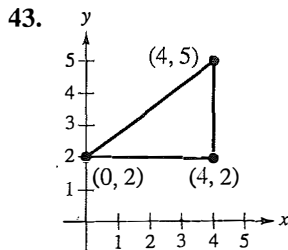
In Exercises 25–30, find the distance between the points algebraically and verify graphically by using centimeter graph paper and a centimeter ruler.

25. $(6, -3), (6, 5)$
26. $(1, 4), (8, 4)$
27. $(-3, -1), (2, -1)$
28. $(-3, -4), (-3, 6)$
29. $(-2, 6), (3, -6)$
30. $(8, 5), (0, 20)$

In Exercises 31–42, (a) plot the points, (b) find the distance between the points, and (c) find the midpoint of the line segment joining the points.

31. $(1, 1), (9, 7)$
32. $(1, 12), (6, 0)$
33. $(-4, 10), (4, -5)$
34. $(-7, -4), (2, 8)$
35. $(-1, 2), (5, 4)$
36. $(2, 10), (10, 2)$
37. $(\frac{1}{2}, 1), (-\frac{5}{2}, \frac{4}{3})$
38. $(-\frac{1}{3}, -\frac{1}{3}), (-\frac{1}{6}, -\frac{1}{2})$
39. $(6.2, 5.4), (-3.7, 1.8)$
40. $(-16.8, 12.3), (5.6, 4.9)$
41. $(-36, -18), (48, -72)$
42. $(1.451, 3.051), (5.906, 11.360)$

In Exercises 43–46, (a) find the length of each side of a right triangle and (b) show that these lengths satisfy the Pythagorean Theorem.



Business In Exercises 47 and 48, estimate the sales of a company in 1998, given the sales in 1996 and 2000. Assume the sales followed a linear pattern.

47.

Year	1996	2000
Sales	\$520,000	\$740,000

48.

Year	1996	2000
Sales	\$4,200,000	\$5,650,000

In Exercises 49–52, show that the points form the vertices of the polygon.

- 49. Right triangle: $(4, 0)$, $(2, 1)$, $(-1, -5)$
- 50. Isosceles triangle: $(1, -3)$, $(3, 2)$, $(-2, 4)$
- 51. Parallelogram: $(2, 5)$, $(0, 9)$, $(-2, 0)$, $(0, -4)$
- 52. Parallelogram: $(0, 1)$, $(3, 7)$, $(4, 4)$, $(1, -2)$

53. **Exploration** A line segment has (x_1, y_1) as one endpoint and (x_m, y_m) as its midpoint. Find the other endpoint (x_2, y_2) of the line segment in terms of $x_1, y_1, x_m,$ and y_m . Use the result to find the coordinates of the endpoint of a line segment if the coordinates of the other endpoint and midpoint are, respectively,

- (a) $(1, -2)$, $(4, -1)$
- (b) $(-5, 11)$, $(2, 4)$.

54. **Exploration** Use the Midpoint Formula three times to find the three points that divide the line segment joining (x_1, y_1) and (x_2, y_2) into four parts. Use the result to find the points that divide the line segment joining the given points into four equal parts.

- (a) $(1, -2)$, $(4, -1)$
- (b) $(-2, -3)$, $(0, 0)$

In Exercises 55–62, find the standard form of the equation of the specified circle.

- 55. Center: $(0, 0)$; radius: 3
- 56. Center: $(0, 0)$; radius: 5
- 57. Center: $(2, -1)$; radius: 4
- 58. Center: $(0, \frac{1}{3})$; radius: $\frac{1}{3}$
- 59. Center: $(-1, 2)$; solution point: $(0, 0)$
- 60. Center: $(3, -2)$; solution point: $(-1, 1)$
- 61. Endpoints of a diameter: $(0, 0)$, $(6, 8)$
- 62. Endpoints of a diameter: $(-4, -1)$, $(4, 1)$

In Exercises 63–68, find the center and radius, and sketch the circle.

- 63. $x^2 + y^2 = 4$
- 64. $x^2 + y^2 = 16$
- 65. $(x - 1)^2 + (y + 3)^2 = 4$
- 66. $x^2 + (y - 1)^2 = 4$
- ★ 67. $(x - \frac{1}{2})^2 + (y - \frac{1}{2})^2 = \frac{9}{4}$
- 68. $(x - \frac{2}{3})^2 + (y + \frac{1}{4})^2 = \frac{25}{9}$

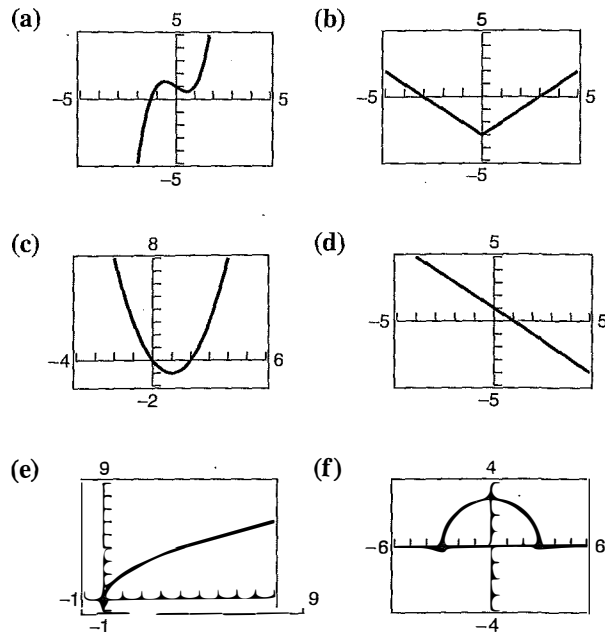
In Exercises 69 and 70, sketch a scatter plot of the data given in the table.

69. **Meteorology** The table shows the lowest temperature of record y (in degrees Fahrenheit) in Duluth, Minnesota, for each month x , where $x = 1$ represents January. (Source: NOAA)

x	1	2	3	4	5	6
y	-39	-33	-29	-5	17	27

x	7	8	9	10	11	12
y	35	32	22	8	-23	-34

In Exercises 17–22, match the equation with its graph. [The graphs are labeled (a), (b), (c), (d), (e), and (f).]



- ★ 17. $y = 1 - x$
- 18. $y = x^2 - 2x$
- 19. $y = \sqrt{9 - x^2}$
- 20. $y = 2\sqrt{x}$
- 21. $y = x^3 - x + 1$
- 22. $y = |x| - 3$

In Exercises 23–36, sketch the graph of the equation.

- 23. $y = -3x + 2$
- 24. $y = 2x - 3$
- 25. $y = 1 - x^2$
- 26. $y = x^2 - 1$
- 27. $y = x^2 - 3x$
- 28. $y = -x^2 - 4x$
- 29. $y = x^3 + 2$
- 30. $y = x^3 - 1$
- 31. $y = \sqrt{x - 3}$
- 32. $y = \sqrt{1 - x}$
- 33. $y = |x - 2|$
- 34. $y = 4 - |x|$
- 35. $x = y^2 - 1$
- 36. $x = y^2 - 4$

In Exercises 37–50, use a graphing utility to graph the equation. Use a standard viewing window. Approximate any x- or y-intercepts of the graph.

- 37. $y = x - 5$
- 38. $y = (x + 1)(x - 3)$
- 39. $y = 3 - \frac{1}{2}x$
- 40. $y = \frac{2}{3}x - 1$
- 41. $y = x^2 - 4x + 3$
- 42. $y = \frac{1}{2}(x + 4)(x - 2)$
- ★ 43. $y = x(x - 2)^2$
- 44. $y = \frac{4}{x^2 + 1}$

- 45. $y = \frac{2x}{x - 1}$
- 46. $y = \frac{4}{x}$
- 47. $y = x\sqrt{x + 6}$
- 48. $y = (6 - x)\sqrt{x}$
- 49. $y = \sqrt[3]{x}$
- 50. $y = \sqrt[3]{x + 1}$

In Exercises 51–54, use a graphing utility to sketch the graph of the equation. Begin by using a standard viewing window. Then graph the equation a second time using the specified viewing window. Which viewing window is better? Explain.

- 51. $y = \frac{5}{2}x + 5$
- 52. $y = -3x + 50$

Xmin = 0
Xmax = 6
Xscl = 1
Ymin = 0
Ymax = 10
Yscl = 1

Xmin = -1
Xmax = 4
Xscl = 1
Ymin = -5
Ymax = 60
Yscl = 5

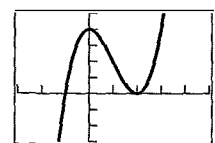
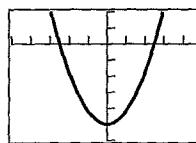
- 53. $y = -x^2 + 10x - 5$
- 54. $y = 4(x + 5)\sqrt{4 - x}$

Xmin = -1
Xmax = 11
Xscl = 1
Ymin = -5
Ymax = 25
Yscl = 2

Xmin = -6
Xmax = 6
Xscl = 1
Ymin = -5
Ymax = 50
Yscl = 4

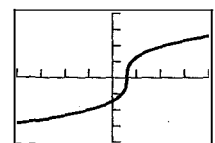
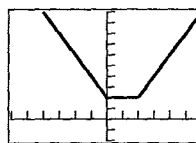
In Exercises 55–58, describe the viewing window of the graph.

- 55. $y = 4x^2 - 25$
- 56. $y = x^3 - 3x^2 + 4$



- 57. $y = |x| + |x - 10|$

- 58. $y = 8\sqrt[3]{x - 6}$



P.3 Exercises

In Exercises 1 and 2, identify the line that has the specified slope.

1. (a) $m = \frac{2}{3}$ (b) m is undefined. (c) $m = -2$
 2. (a) $m = 0$ (b) $m = -\frac{3}{4}$ (c) $m = 1$

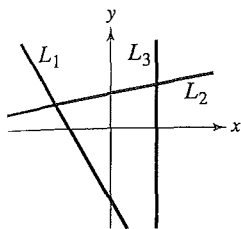


FIGURE FOR 1

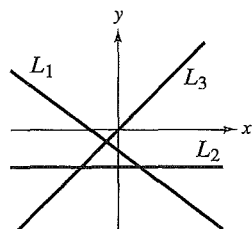
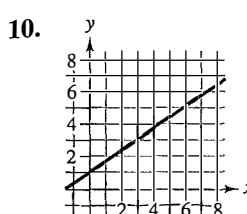
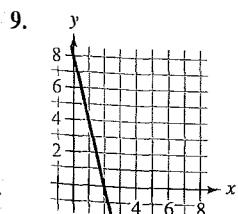
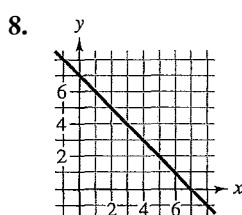
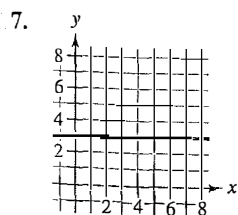
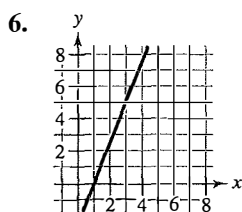
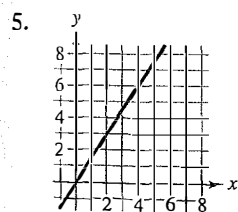


FIGURE FOR 2

In Exercises 3 and 4, sketch the line through the point with each indicated slope on the same set of coordinate axes.

- | Point | Slopes | | | |
|------------|--------|--------|-------------------|---------------|
| 3. (2, 3) | (a) 0 | (b) 1 | (c) 2 | (d) -3 |
| 4. (-4, 1) | (a) 3 | (b) -3 | (c) $\frac{1}{2}$ | (d) Undefined |

In Exercises 5–10, estimate the slope of the line.



In Exercises 11–14, plot the points and find the slope of the line passing through the points. Verify the slope using the *draw* feature on your graphing utility to graph the line segment connecting the two points. (Use a square setting.)

11. (0, -10), (-4, 0) 12. (2, 4), (4, -4)
 13. (-6, -1), (-6, 4) 14. (-3, -2), (1, 6)

In Exercises 15–20, you are given the slope of the line and a point on the line. Find three additional points through which the line passes. (There are many correct answers.)

- | Point | Slope |
|--------------|--------------------|
| 15. (2, 1) | $m = 0$ |
| 16. (-4, 1) | m is undefined. |
| 17. (-5, 4) | $m = 2$ |
| 18. (0, -9) | $m = -2$ |
| 19. (7, -2) | $m = \frac{1}{2}$ |
| 20. (-1, -6) | $m = -\frac{1}{2}$ |

In Exercises 21–24, determine whether the lines L_1 and L_2 passing through the pairs of points are parallel, perpendicular, or neither. Use a graphing utility to graph the line segments connecting the pairs of points on the respective lines. (Use a square setting.)

21. $L_1: (0, -1), (5, 9)$ 22. $L_1: (-2, -1), (1, 5)$
 $L_2: (0, 3), (4, 1)$ $L_2: (1, 3), (5, -5)$
 23. $L_1: (3, 6), (-6, 0)$ 24. $L_1: (4, 8), (-4, 2)$
 $L_2: (0, -1), (5, \frac{7}{3})$ $L_2: (3, -5), (-1, \frac{1}{3})$

In Exercises 25–32, (a) find the slope and y -intercept (if possible) of the equation of the line algebraically, (b) sketch the line by hand, and (c) use a graphing utility to verify your answers to parts (a) and (b).

25. $5x - y + 3 = 0$ 26. $2x + 3y - 9 = 0$
 27. $5x - 2 = 0$ 28. $3x + 7 = 0$
 29. $3y + 5 = 0$ 30. $-11 - 8y = 0$
 * 31. $7x + 6y - 30 = 0$ 32. $x - y - 10 = 0$

P Exercises

In Exercises 1–6, determine whether the given values of x are solutions of the equation.

Equation	Values
* 1. $\frac{5}{2x} - \frac{4}{x} = 3$	(a) $x = -\frac{1}{2}$ (b) $x = 4$
	(c) $x = 0$ (d) $x = \frac{1}{4}$
2. $\frac{x}{2} + \frac{6x}{7} = \frac{19}{14}$	(a) $x = -2$ (b) $x = 1$
	(c) $x = \frac{1}{2}$ (d) $x = 7$
3. $3 + \frac{1}{x+2} = 4$	(a) $x = -1$ (b) $x = -2$
	(c) $x = 0$ (d) $x = 5$
4. $\frac{(x+5)(x-3)}{2} = 24$	(a) $x = -3$ (b) $x = -2$
	(c) $x = 7$ (d) $x = 9$
5. $\frac{\sqrt{x+4}}{6} + 3 = 4$	(a) $x = -3$ (b) $x = 0$
	(c) $x = 21$ (d) $x = 32$
6. $\frac{\sqrt[3]{x-8}}{3} = -\frac{2}{3}$	(a) $x = -16$ (b) $x = 0$
	(c) $x = 9$ (d) $x = 16$

In Exercises 7–12, determine whether the equation is an identity or a conditional equation.

7. $2(x-1) = 2x-2$
8. $-7(x-3) + 4x = 3(7-x)$
9. $x^2 - 8x + 5 = (x-4)^2 - 11$
10. $x^2 + 2(3x-2) = x^2 + 6x - 4$
11. $3 + \frac{1}{x+1} = \frac{4x}{x+1}$
12. $\frac{5}{x} + \frac{3}{x} = 24$

In Exercises 13 and 14, solve the equation in two ways. Then explain which way was easier for you.

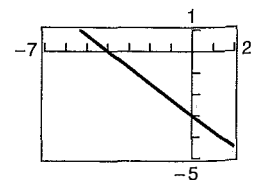
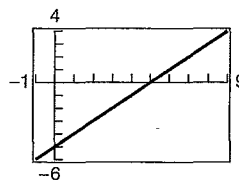
13. $\frac{3x}{8} - \frac{4x}{3} = 4$
14. $\frac{3z}{8} - \frac{z}{10} = 6$

In Exercises 15–30, solve the equation (if possible). Then use a graphing utility to verify your solution.

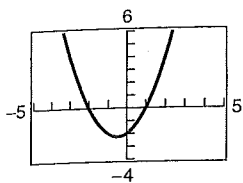
15. $\frac{5x}{4} + \frac{1}{2} = x - \frac{1}{2}$
16. $\frac{x}{5} - \frac{x}{2} = 3$
17. $\frac{3}{2}(z+5) - \frac{1}{4}(z+24) = 0$
18. $\frac{3x}{2} + \frac{1}{4}(x-2) = 10$
19. $\frac{100-4u}{3} = \frac{5u+6}{4} + 6$
20. $\frac{17+y}{y} + \frac{32+y}{y} = 100$
21. $\frac{5x-4}{5x+4} = \frac{2}{3}$
22. $\frac{15}{x} - 4 = \frac{6}{x} + 3$
23. $\frac{1}{x-3} + \frac{1}{x+3} = \frac{10}{x^2-9}$
24. $\frac{1}{x-2} + \frac{3}{x+3} = \frac{4}{x^2+x-6}$
25. $\frac{7}{2x+1} - \frac{8x}{2x-1} = -4$
26. $\frac{4}{u-1} + \frac{6}{3u+1} = \frac{15}{3u+1}$
27. $\frac{1}{x} + \frac{2}{x-5} = 0$
28. $\frac{6}{x} - \frac{2}{x+3} = \frac{3(x+5)}{x(x+3)}$
29. $\frac{3}{x(x-3)} + \frac{4}{x} = \frac{1}{x-3}$
30. $3 = 2 + \frac{2}{z+2}$

In Exercises 31–40, find the x - and y -intercepts of the graph of the equation.

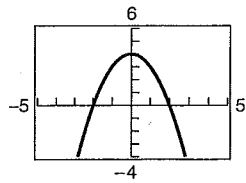
31. $y = x - 5$
32. $y = -\frac{3}{4}x - 3$



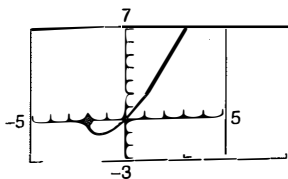
33. $y = x^2 + x - 2$



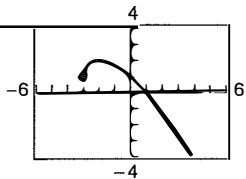
34. $y = 4 - x^2$



35. $y = x\sqrt{x+2}$



36. $y = -\frac{1}{2}x\sqrt{x+3} + 1$



37. $y = |x - 2| - 4$

38. $y = 3 - \frac{1}{2}|x + 1|$

39. $xy - 2y - x + 1 = 0$

40. $x^2y - x^2 + 4y = 0$

In Exercises 41–46, the solution(s) of the equation are given. Verify the solution(s) both algebraically and graphically.

Equation	Solution(s)
41. $y = 12 - 4x$	$x = 3$
42. $y = 3(x - 5) + 9$	$x = 2$
43. $y = x^2 - 2.5x - 6$	$x = -1.5, 4$
44. $y = x^3 - 9x^2 + 18x$	$x = 0, 3, 6$
45. $y = \frac{x+2}{3} - \frac{x-1}{5} - 1$	$x = 1$
46. $y = x - 3 - \frac{10}{x}$	$x = -2, 5$

Graphical Analysis In Exercises 47–50, use a graphing utility to graph the equation and approximate any x -intercepts. Set $y = 0$ and solve the resulting equation. Compare the results with the x -intercepts of the graph.

47. $y = 2(x - 1) - 4$

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

49. $y = 20 - (3x - 10)$

50. $y = 10 + 2(x - 2)$

In Exercises 51–70, solve the equation algebraically. Then write the equation in the form $y = 0$ and use a graphing utility to verify the algebraic solution.

51. $27 - 4x = 12$

52. $3.5x - 8 = 0.5x$

53. $25(x - 3) = 12(x + 2) - 10$

54. $1200 = 300 + 2(x - 500)$

55. $\frac{3x}{2} + \frac{1}{4}(x - 2) = 10$

56. $0.60x + 0.40(100 - x) = 50$

57. $\frac{2x}{3} = 10 - \frac{24}{x}$

58. $\frac{x-3}{25} = \frac{x-5}{12}$

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

60. $\frac{6}{x} + \frac{8}{x+5} = 3$

61. $3(x + 3) = 5(1 - x) - 1$

62. $(x + 1)^2 + 2(x - 2) = (x + 1)(x - 2)$

63. $2x^3 - x^2 - 18x + 9 = 0$

64. $4x^3 + 12x^2 - 26x - 24 = 0$

65. $x^4 = 2x^3 + 1$

66. $x^5 = 3 + 2x^3$

67. $\frac{2}{x+2} = 3$

68. $\frac{5}{x} = 1 + \frac{3}{x+2}$

69. $|x - 3| = 4$

70. $\sqrt{x-2} = 3$

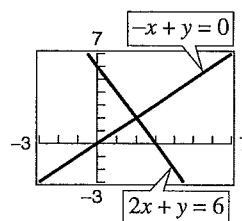
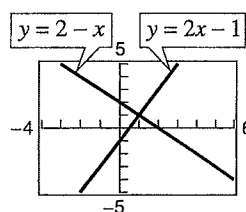
In Exercises 71–74, determine any point(s) of intersection algebraically. Then verify your result numerically by creating a table of values for each equation.

71. $y = 2 - x$

72. $2x + y = 6$

$y = 2x - 1$

$-x + y = 0$

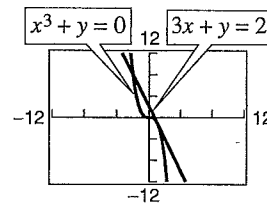
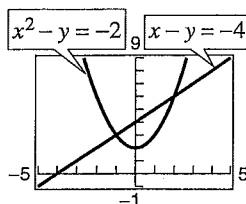


73. $x - y = -4$

74. $3x + y = 2$

$x^2 - y = -2$

$x^3 + y = 0$



In Exercises 30–37, use a graphing utility to graph the equation. Approximate any intercepts.

30. $y = \frac{1}{4}(x + 1)^3$ 31. $y = 4 - (x - 4)^2$
 32. $y = \frac{1}{4}x^4 - 2x^2$ 33. $y = \frac{1}{4}x^3 - 3x$
 34. $y = x\sqrt{9 - x^2}$ 35. $y = x\sqrt{x + 3}$
 36. $y = |x - 4| - 4$ 37. $y = |x + 2| + |3 - x|$

38. **Data Analysis** The average expenditures y (in dollars) for automobile insurance per insured vehicle from 1992 through 1996 are shown in the table. (Source: National Association of Insurance Commissioners)

x	1992	1993	1994	1995	1996
y	616	638	651	667	685

- (a) Use a graphing utility to plot the data.
 (b) Use the regression capabilities of a graphing utility to find the best-fitting linear model (let $t = 2$ correspond to 1992).
 (c) Graph the model in the same viewing window with the data.
 (d) Use the model to estimate the values of y for the years 2000 and 2002.

- ★ **P3** In Exercises 39–44, plot the two points and find the slope of the line that passes through the points.

39. $(-3, 2), (8, 2)$ 40. $(7, -1), (7, 12)$
 41. $(\frac{3}{2}, 1), (5, \frac{5}{2})$ 42. $(-\frac{3}{4}, \frac{5}{6}), (\frac{1}{2}, -\frac{5}{2})$
 43. $(-4.5, 6), (2.1, 3)$
 44. $(-2.7, -6.3), (-1, -1.2)$

In Exercises 45–48, use the concept of slope to find t such that the three points are collinear.

45. $(-2, 5), (0, t), (1, 1)$ 46. $(-6, 1), (1, t), (10, 5)$
 47. $(1, -4), (t, 3), (5, 10)$ 48. $(-3, 3), (t, -1), (8, 6)$

In Exercises 49–58, (a) find an equation of the line that passes through the given point and has the specified slope, and (b) find three additional points through which the line passes.

- | Point | Slope |
|---------------|--------------------|
| 49. $(2, -1)$ | $m = \frac{1}{4}$ |
| 50. $(-3, 5)$ | $m = -\frac{3}{2}$ |
| 51. $(0, -5)$ | $m = \frac{3}{2}$ |

- | Point | Slope |
|-------------------------|--------------------|
| 52. $(3, 0)$ | $m = -\frac{2}{3}$ |
| 53. $(\frac{1}{5}, -5)$ | $m = -1$ |
| 54. $(0, \frac{7}{8})$ | $m = -4$ |
| 55. $(-2, 6)$ | $m = 0$ |
| 56. $(-8, 8)$ | $m = 0$ |
| 57. $(10, -6)$ | m is undefined. |
| 58. $(5, 4)$ | m is undefined. |

In Exercises 59–64, (a) find an equation of the line (in slope-intercept form) that passes through the points and (b) sketch the graph of the equation.

59. $(2, -1), (4, -1)$ 60. $(0, 0), (0, 10)$
 61. $(2, 1), (14, 6)$ 62. $(-2, 2), (3, -10)$
 63. $(-1, 0), (6, 2)$ 64. $(1, 6), (4, 2)$

In Exercises 65–68, write equations of the lines through the point (a) parallel to the given line and (b) perpendicular to the given line. Verify your result with a graphing utility (use a square setting).

- | Point | Line |
|----------------|---------------|
| 65. $(3, -2)$ | $5x - 4y = 8$ |
| 66. $(-8, 3)$ | $2x + 3y = 5$ |
| ★67. $(-6, 2)$ | $x = 4$ |
| 68. $(3, -4)$ | $y = 2$ |

- ★ **P4** In Exercises 69–72, solve the equation (if possible) and use a graphing utility to verify your solution.

69. $14 + \frac{2}{x-1} = 10$ 70. $6 - \frac{11}{x} = 3 + \frac{7}{x}$
 71. $\frac{9x}{3x-1} - \frac{4}{3x+1} = 3$
 72. $\frac{5}{x-5} + \frac{1}{x+5} = \frac{2}{x^2-25}$

In Exercises 73–76, determine the x - and y -intercepts of the graph of the equation algebraically. Use a graphing utility to verify your answer.

73. $-x + y = 3$ 74. $x - 5y = 20$
 75. $y = x^2 - 9x + 8$ 76. $y = 25 - x^2$

In Exercises 77 and 78, use a graphing utility to graph the equation and approximate the x - and y -intercepts.

77. $y = -|x + 5| - 2$ 78. $y = 6 - 2|x - 3|$

In Exercises 79–84, use a graphing utility to approximate any solutions (accurate to three decimal places) of the equation.

79. $5(x - 2) - 1 = 0$ 80. $12 - 5(x - 7) = 0$
 81. $3x^3 - 2x + 4 = 0$ 82. $\frac{1}{3}x^3 - x + 4 = 0$
 83. $x^4 - 3x + 1 = 0$ 84. $6 - \frac{1}{2}x^2 + \frac{5}{6}x^4 = 0$

In Exercises 85–88, determine algebraically any points of intersection of the graphs of the equations. Use a graphing utility to verify your answer(s).

85. $3x + 5y = -7$ 86. $x - y = 3$
 $-x - 2y = 3$ $2x + y = 12$
 87. $x^2 + 2y = 14$ 88. $y = -x + 7$
 $3x + 4y = 1$ $y = 2x^3 - x + 9$

In Exercises 89–98, use any method to solve the equation. Use a graphing utility to verify your solution(s).

89. $6x = 3x^2$
 90. $15 + x - 2x^2 = 0$
 91. $(x + 4)^2 = 18$
 92. $16x^2 = 25$
 93. $x^2 - 12x + 30 = 0$
 94. $x^2 + 6x - 3 = 0$
 95. $2x^2 + 9x - 5 = 0$
 96. $-x^2 - x + 15 = 0$
 97. $x^2 - 4x - 10 = 0$
 98. $-2x^2 - 13x = 0$

In Exercises 99–116, solve the equation (if possible) and use a graphing utility to verify your solution.

99. $3x^3 - 26x^2 + 16x = 0$ 100. $216x^4 - x = 0$
 101. $5x^4 - 12x^3 = 0$ 102. $4x^3 - 6x^2 = 0$
 103. $\sqrt{x + 4} = 3$ 104. $\sqrt{x - 2} - 8 = 0$
 105. $\sqrt{2x + 3} + \sqrt{x - 2} = 2$
 106. $5\sqrt{x} - \sqrt{x - 1} = 6$
 107. $(x - 1)^{2/3} - 25 = 0$ 108. $(x + 2)^{3/4} = 27$
 109. $3\left(1 - \frac{1}{5t}\right) = 0$ 110. $\frac{1}{x - 2} = 3$
 111. $\frac{4}{(x - 4)^2} = 1$ 112. $\frac{1}{(t + 1)^2} = 1$
 113. $|x - 5| = 10$ 114. $|2x + 3| = 7$
 115. $|x^2 - 3| = 2x$ 116. $|x^2 - 6| = x$

P.5 In Exercises 117–134, solve the inequality and graph the solution on the real number line. Use a graphing utility to verify your solution.

117. $8x - 3 < 6x + 15$
 118. $\frac{1}{2}(3 - x) > \frac{1}{3}(2 - 3x)$
 119. $-2 < -x + 7 \leq 10$
 120. $-6 \leq 3 - 2(x - 5) < 14$
 121. $|x - 2| < 1$ 122. $|x| \leq 4$
 123. $\left|x - \frac{3}{2}\right| \geq \frac{3}{2}$ 124. $|x - 3| > 4$
 125. $4|3 - 2x| \leq 16$ 126. $|x + 9| + 7 > 19$
 127. $x^2 - 2x \geq 3$ 128. $4x^2 - 23x \leq 6$
 129. $x^3 - 16x \geq 0$ 130. $12x^3 - 20x^2 < 0$
 131. $\frac{x - 5}{3 - x} < 0$ 132. $\frac{2}{x + 1} \leq \frac{3}{x - 1}$
 133. $\frac{3x + 8}{x - 3} \leq 4$ 134. $\frac{x + 8}{x + 5} - 2 < 0$

135. **Accuracy of Measurement** The side of a square is measured as 20.8 inches with a possible error of $\frac{1}{16}$ inch. Using these measurements, determine the interval containing the area of the square.

Synthesis

True or False? In Exercises 136 and 137, determine whether the statement is true or false. Justify your answer.

136. If $ab = 0$, then the point (a, b) lies on the x -axis or on the y -axis.
 137. The graph of an equation may have two distinct y -intercepts.
 138. In your own words, explain the difference between an identity and a conditional equation.
 139. In your own words, explain what is meant by equivalent equations. Describe the steps used to transform an equation into an equivalent equation.