Review Exercises

See CalcChat.com for tutorial help and worked-out solutions to odd-numbered exercises.

Finding Intercepts **In Exercises 1–4, find any intercepts.**

1. $y = 5x - 8$

2. $y = x^2 - 8x + 12$

3. $y = \dfrac{x - 3}{x - 4}$

4. $y = (x - 3)\sqrt{x + 4}$

Testing for Symmetry **In Exercises 5–8, test for symmetry with respect to each axis and to the origin.**

5. $y = x^2 + 4x$

6. $y = x^4 - x^2 + 3$

7. $y^2 = x^2 - 5$

8. $xy = -2$

Using Intercepts and Symmetry to Sketch a Graph **In Exercises 9–14, sketch the graph of the equation. Identify any intercepts and test for symmetry.**

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

10. $y = -x^2 + 4$

11. $y = x^3 - 4x$

12. $y^2 = 9 - x$

13. $y = 2\sqrt{4 - x}$

14. $y = |x - 4| - 4$

Finding Points of Intersection **In Exercises 15–18, find the points of intersection of the graphs of the equations.**

15.
$5x + 3y = -1$
$x - y = -5$

16.
$2x + 4y = 9$
$6x - 4y = 7$

17.
$x - y = -5$
$x^2 - y = 1$

18.
$x^2 + y^2 = 1$
$-x + y = 1$

Finding the Slope of a Line **In Exercises 19 and 20, plot the points and find the slope of the line passing through them.**

19. $\left(\frac{3}{2}, 1\right), \left(5, \frac{5}{2}\right)$

20. $(-7, 8), (-1, 8)$

Finding an Equation of a Line **In Exercises 21–24, find an equation of the line that passes through the point and has the indicated slope. Then sketch the line.**

	Point	Slope		Point	Slope
21.	$(3, -5)$	$m = \frac{7}{4}$	**22.**	$(-8, 1)$	m is undefined.
23.	$(-3, 0)$	$m = -\frac{2}{3}$	**24.**	$(5, 4)$	$m = 0$

Sketching Lines in the Plane **In Exercises 25–28, use the slope and y-intercept to sketch a graph of the equation.**

25. $y = 6$

26. $x = -3$

27. $y = 4x - 2$

28. $3x + 2y = 12$

Finding an Equation of a Line **In Exercises 29 and 30, find an equation of the line that passes through the points. Then sketch the line.**

29. $(0, 0), (8, 2)$

30. $(-5, 5), (10, -1)$

31. Finding Equations of Lines Find equations of the lines passing through $(-3, 5)$ and having the following characteristics.

(a) Slope of $\frac{7}{16}$

(b) Parallel to the line $5x - 3y = 3$

(c) Perpendicular to the line $3x + 4y = 8$

(d) Parallel to the y-axis

32. Finding Equations of Lines Find equations of the lines passing through $(2, 4)$ and having the following characteristics.

(a) Slope of $-\frac{2}{3}$

(b) Perpendicular to the line $x + y = 0$

(c) Passing through the point $(6, 1)$

(d) Parallel to the x-axis

33. Rate of Change The purchase price of a new machine is \$12,500, and its value will decrease by \$850 per year. Use this information to write a linear equation that gives the value V of the machine t years after it is purchased. Find its value at the end of 3 years.

34. Break-Even Analysis A contractor purchases a piece of equipment for \$36,500 that costs an average of \$9.25 per hour for fuel and maintenance. The equipment operator is paid \$13.50 per hour, and customers are charged \$30 per hour.

(a) Write an equation for the cost C of operating this equipment for t hours.

(b) Write an equation for the revenue R derived from t hours of use.

(c) Find the break-even point for this equipment by finding the time at which $R = C$.

Evaluating a Function **In Exercises 35–38, evaluate the function at the given value(s) of the independent variable. Simplify the result.**

35. $f(x) = 5x + 4$

(a) $f(0)$

(b) $f(5)$

(c) $f(-3)$

(d) $f(t + 1)$

36. $f(x) = x^3 - 2x$

(a) $f(-3)$

(b) $f(2)$

(c) $f(-1)$

(d) $f(c - 1)$

37. $f(x) = 4x^2$

$\dfrac{f(x + \Delta x) - f(x)}{\Delta x}$

38. $f(x) = 2x - 6$

$\dfrac{f(x) - f(-1)}{x - 1}$

Finding the Domain and Range of a Function **In Exercises 39–42, find the domain and range of the function.**

39. $f(x) = x^2 + 3$

40. $g(x) = \sqrt{6 - x}$

41. $f(x) = -|x + 1|$

42. $h(x) = \dfrac{2}{x + 1}$

Using the Vertical Line Test **In Exercises 43–46, sketch the graph of the equation and use the Vertical Line Test to determine whether y is a function of x.**

43. $x - y^2 = 6$

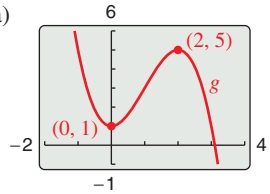
44. $x^2 - y = 0$

45. $y = \dfrac{|x-2|}{x-2}$

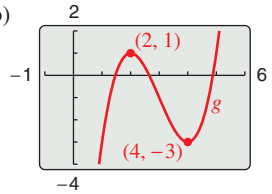
46. $x = 9 - y^2$

47. Transformations of Functions Use a graphing utility to graph $f(x) = x^3 - 3x^2$. Use the graph to write a formula for the function g shown in the figure. To print an enlarged copy of the graph, go to *MathGraphs.com.*

(a)



(b)



48. Conjecture

(a) Use a graphing utility to graph the functions f, g, and h in the same viewing window. Write a description of any similarities and differences you observe among the graphs.

Odd powers: $f(x) = x$, $g(x) = x^3$, $h(x) = x^5$

Even powers: $f(x) = x^2$, $g(x) = x^4$, $h(x) = x^6$

(b) Use the result in part (a) to make a conjecture about the graphs of the functions $y = x^7$ and $y = x^8$. Use a graphing utility to verify your conjecture.

49. Think About It Use the results of Exercise 48 to guess the shapes of the graphs of the functions f, g, and h. Then use a graphing utility to graph each function and compare the result with your guess.

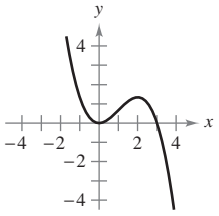
(a) $f(x) = x^2(x-6)^2$

(b) $g(x) = x^3(x-6)^2$

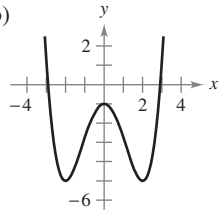
(c) $h(x) = x^3(x-6)^3$

50. Think About It What is the minimum degree of the polynomial function whose graph approximates the given graph? What sign must the leading coefficient have?

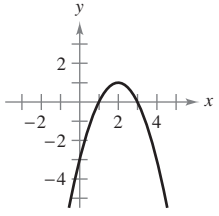
(a)



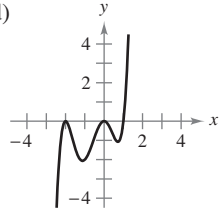
(b)



(c)



(d)



51. Stress Test A machine part was tested by bending it x centimeters 10 times per minute until the time y (in hours) of failure. The results are recorded in the table.

x	3	6	9	12	15
y	61	56	53	55	48

x	18	21	24	27	30
y	35	36	33	44	23

(a) Use the regression capabilities of a graphing utility to find a linear model for the data.

(b) Use a graphing utility to plot the data and graph the model.

(c) Use the graph to determine whether there may have been an error made in conducting one of the tests or in recording the results. If so, eliminate the erroneous point and find the model for the remaining data.

52. Median Income The data in the table show the median income y (in thousands of dollars) for males of various ages x in the United States in 2009. *(Source: U.S. Census Bureau)*

x	20	30	40	50	60	70
y	10.0	31.9	42.2	44.7	41.3	25.9

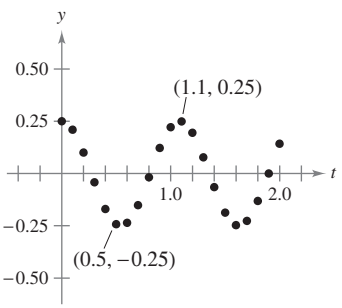
(a) Use the regression capabilities of a graphing utility to find a quadratic model for the data.

(b) Use a graphing utility to plot the data and graph the model.

(c) Use the model to approximate the median income for a male who is 26 years old.

(d) Use the model to approximate the median income for a male who is 34 years old.

53. Harmonic Motion The motion of an oscillating weight suspended by a spring was measured by a motion detector. The data collected and the approximate maximum (positive and negative) displacements from equilibrium are shown in the figure. The displacement y is measured in feet, and the time t is measured in seconds.



(a) Is y a function of t? Explain.

(b) Approximate the amplitude and period of the oscillations.

(c) Find a model for the data.

(d) Use a graphing utility to graph the model in part (c). Compare the result with the data in the figure.