

## REVIEW EXERCISES FOR CHAPTER P

**P.1** In Exercises 1–4, find the intercepts (if any).

1.  $y = 2x - 3$                       2.  $y = (x - 1)(x - 3)$   
 3.  $y = \frac{x-1}{x-2}$                       4.  $xy = 4$

In Exercises 5 and 6, check for symmetry with respect to both axes and to the origin.

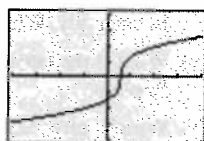
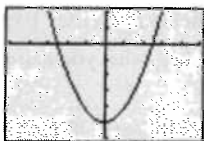
5.  $x^2y - x^2 + 4y = 0$                       6.  $y = x^4 - x^2 + 3$

In Exercises 7–14, sketch the graph of the equation.

7.  $y = \frac{1}{2}(-x + 3)$                       8.  $4x - 2y = 6$   
 9.  $-\frac{1}{3}x + \frac{5}{6}y = 1$                       10.  $0.02x + 0.15y = 0.25$   
 11.  $y = 7 - 6x - x^2$                       12.  $y = 6x - x^2$   
 13.  $y = \sqrt{5 - x}$                       14.  $y = |x - 4| - 4$

**P.2** In Exercises 15 and 16, describe the viewing window of a graphing utility that yields the figure.

15.  $y = 4x^2 - 25$                       16.  $y = 8\sqrt[3]{x - 6}$

**P.3** In Exercises 17 and 18, use a graphing utility to find the point(s) of intersection of the graphs of the equations.

17.  $3x - 4y = 8$                       18.  $x - y + 1 = 0$   
 $x + y = 5$                        $y - x^2 = 7$

19. **Think About It** Write an equation whose graph has intercepts at  $x = -2$  and  $x = 2$  and is symmetric with respect to the origin.20. **Think About It** For what value of  $k$  does the graph of  $y = kx^3$  pass through the point?

- (a) (1, 4)                      (b) (-2, 1)  
 (c) (0, 0)                      (d) (-1, -1)

**P.2** In Exercises 21 and 22, plot the points and find the slope of the line passing through the points.

21.  $(\frac{1}{2}, 1), (5, \frac{5}{2})$                       22. (7, -1), (7, 12)

In Exercises 23 and 24, use the concept of slope to find  $t$  such that the three points are collinear.

23. (-2, 5), (0,  $t$ ), (1, 1)                      24. (-3, 3), ( $t$ , -1), (8, 6)

In Exercises 25–28, find an equation of the line that passes through the point with the indicated slope. Sketch the line.

25. (0, -5),  $m = \frac{3}{2}$                       26. (-2, 6),  $m = 0$   
 27. (-3, 0),  $m = -\frac{2}{3}$                       28. (5, 4),  $m$  is undefined.

29. Find the equations of the lines passing through (-2, 4) and having the following characteristics.

- (a) Slope of  $\frac{7}{16}$   
 (b) Parallel to the line  $5x - 3y = 3$   
 (c) Passing through the origin  
 (d) Parallel to the  $y$ -axis

30. Find the equations of the lines passing through (1, 3) and having the following characteristics.

- (a) Slope of  $-\frac{2}{3}$   
 (b) Perpendicular to the line  $x + y = 0$   
 (c) Passing through the point (2, 4)  
 (d) Parallel to the  $x$ -axis

31. **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.32. **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  $R = C$ .

**P.3** In Exercises 33–36, sketch the graph of the equation and use the vertical line test to determine whether the equation expresses  $y$  as a function of  $x$ .

33.  $x - y^2 = 0$                       34.  $x^2 - y = 0$   
 35.  $y = x^2 - 2x$                       36.  $x = 9 - y^2$

37. Evaluate (if possible) the function  $f(x) = 1/x$  at the specified values of the independent variable, and simplify the results.

- (a)  $f(0)$                       (b)  $\frac{f(1 + \Delta x) - f(1)}{\Delta x}$

38. Evaluate (if possible) the function at each value of the independent variable.

$$f(x) = \begin{cases} x^2 + 2, & x < 0 \\ |x - 2|, & x \geq 0 \end{cases}$$

- (a)  $f(-4)$                       (b)  $f(0)$                       (c)  $f(1)$

39. Find the domain and range of each function.

(a)  $y = \sqrt{36 - x^2}$  (b)  $y = \frac{7}{2x - 10}$  (c)  $y = \begin{cases} x^2, & x < 0 \\ 2 - x, & x \geq 0 \end{cases}$

40. Given  $f(x) = 1 - x^2$  and  $g(x) = 2x + 1$ , find the following.

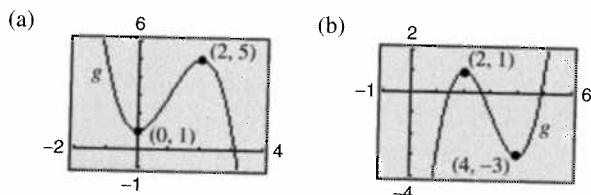
(a)  $f(x) - g(x)$  (b)  $f(x)g(x)$  (c)  $g(f(x))$

41. Sketch (on the same set of coordinate axes) a graph of  $f$  for  $c = -2, 0$ , and  $2$ .

(a)  $f(x) = x^3 + c$  (b)  $f(x) = (x - c)^3$

(c)  $f(x) = (x - 2)^3 + c$  (d)  $f(x) = cx^3$

42. 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 the website [www.mathgraphs.com](http://www.mathgraphs.com).



43. 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.

44. Think About It Use the result of Exercise 43 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.

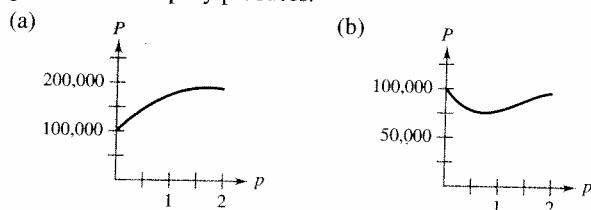
(a)  $f(x) = x^2(x - 6)^2$  (b)  $g(x) = x^3(x - 6)^2$

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

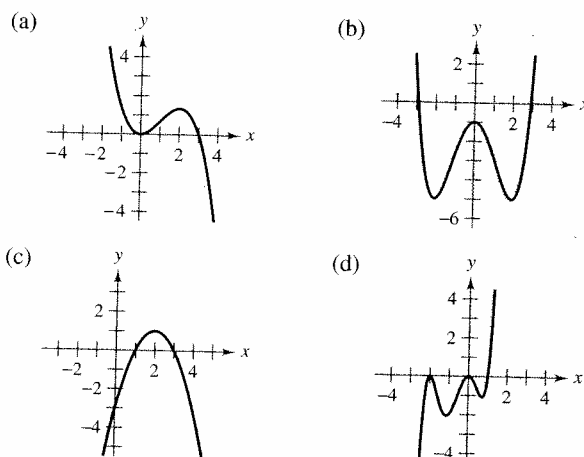
45. Area A wire 24 inches long is to be cut into four pieces to form a rectangle whose shortest side has a length of  $x$ .

- (a) Express the area  $A$  of the rectangle as a function of  $x$ .  
 (b) Determine the domain of the function and use a graphing utility to graph the function over that domain.  
 (c) Use the graph of the function to approximate the maximum area of the rectangle. Make a conjecture about the dimensions that yield a maximum area.

46. Writing The following graphs give the profits  $P$  for two small companies over a period  $p$  of 2 years. Create a story to describe the behavior of each profit function for some hypothetical product the company produces.



47. 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?



#### P.4

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

$x$	3	6	9	12	15	18	21	24	27	30
$y$	61	56	53	55	48	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 revised data.

49. 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.

