

Chapter 2: Sections 1-5, Chapter 3: Sections 1,2,4 Chapter 4: Sections 2,3

1. Write a formula for a linear function that has a slope of  $\frac{2}{3}$  and passes through the point (-6,4).
2. Write a formula for the linear function that models the following situation. Clearly indicate what the variables represent and find the domain: In 1992, the rate of injury cases recorded in private industry per 100 full-time workers was 8.3 and it decreased on average, by 0.32 injuries every year until 2001.
3. Find the equation of the line passing through (4,7) and (-2,-3). Write your answer in slope-intercept form.
4. Find the equation of the line through (2,-5) that is parallel to  $3x + 2y = 6$ . Write your answer in slope-intercept form.
5. Find the equation of the line through (2,3) that is perpendicular to  $2x + y = -3$ . Write your answer in slope-intercept form.
6. Given the point (2,5), find:
  - a. The equation of the vertical line through it.
  - b. The equation of the horizontal line through it.
7. The weight of an object on Earth is directly proportional to the weight of an object on Mars. If a 25-pound object on Earth weighs 10 pounds on Mars, how much would a 195-pound astronaut weigh on Mars?
8. Solve for the given variable:
  - a.  $2(1-3a)+1=3a$
  - b.  $\frac{7}{3}(2b-1)-\frac{2}{5}(4-3b)=\frac{1}{5}b$
  - c.  $|-3c-2|=5$
9. Solve for the given variable and classify the equation as a contradiction, and identity, or a conditional equation.
  - a.  $\frac{t+1}{2}=\frac{3t-2}{6}$
  - b.  $\frac{1}{2}x-2(x-1)=-\frac{3}{2}x+2$
  - c.  $5(x-1995)-15=65$
10. A radiator holds 5 gallons of fluid. If it is full with an 80% antifreeze mixture, how much fluid should be drained and replaced with water to result in a 50% antifreeze mixture?
11. At 2:00 p.m., a runner heads north on a highway jogging at 10 miles per hour. At 2:30 p.m., a driver heads north on the same highway to pick up the runner. If the car travels at 55 mph., how long will it take for the driver to catch the runner?
12. Solve the following inequalities. Express your answers in interval notation.
  - a.  $5x-2(x+3)\geq 4-3x$
  - b.  $\frac{2}{3}(1-2x)-\frac{3}{2}x+\frac{5}{6}x>\frac{2x-1}{3}+1$
  - c.  $|-7x-3|\geq 5$

d.  $|-3x+1| \leq 4$

13. The number of Harley-Davidson motorcycles manufactured between 1985 and 1995 can be approximated by  $N(x) = 6409(x - 1985) + 30,300$ , where  $x$  is the year.

- a. Did the demand for Harley-Davidson motorcycles increase or decrease over this time period? Explain your answer.
- b. Estimate the years when production was between 56,000 and 75,000.

14. For the following piecewise-defined function,  $f(x) = \begin{cases} 3 & \text{if } -4 \leq x \leq -1 \\ x-2 & \text{if } -1 < x \leq 2 \\ 0.5x & \text{if } 2 < x \leq 4 \end{cases}$ , find:

- a. The domain of  $f$ .
- b.  $f(-2), f(0), f(2)$ , and  $f(3)$

15. Write  $f(x) = x^2 + 10x + 7$  in the form  $f(x) = a(x - h)^2 + k$  and identify the vertex.

16. Solve the quadratic equation:  $\frac{1}{2}t^2 + \frac{1}{4} = -\frac{3}{4}t$

17. Solve by completing the square:  $2x^2 + 4x - 5 = 0$

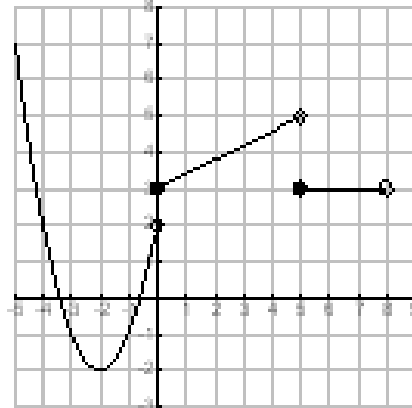
18. Use the discriminant to determine the number of real solutions and then solve the quadratic:

$9x(x - 4) = -36$ .

19. The cost,  $C$ , in dollars of manufacturing  $x$  scooters at Scooter Productions is given by  $C(x) = 2x^2 - 800x + 92,000$ . Find the number of scooters that must be manufactured to minimize the cost.

20. Given the function  $f(x) = x^2$  and the function  $g(x) = 2(x + 1)^2 - 5$ . Describe the transformation used to create  $g(x)$  from  $f(x)$ .

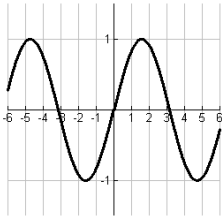
21. Indicate the intervals for which the function (shown at the right) is increasing, decreasing, or constant.



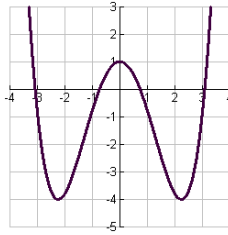
22. Classify the following functions as even, odd, or neither:

- a.  $f(x) = 2x - 4$
- b.  $f(x) = -x^6 + 5x^2$
- c.  $f(x) = \frac{1}{x}$

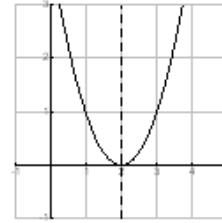
23. . Classify the following functions as even, odd, or neither:



a.

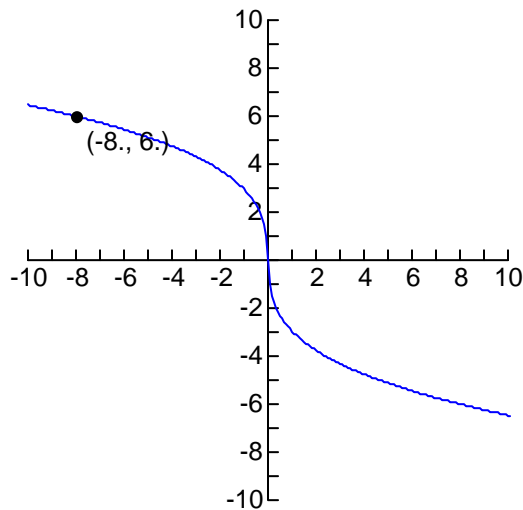


b.



c.

24. Use the point shown to determine a second point (other than the origin) on the graph:



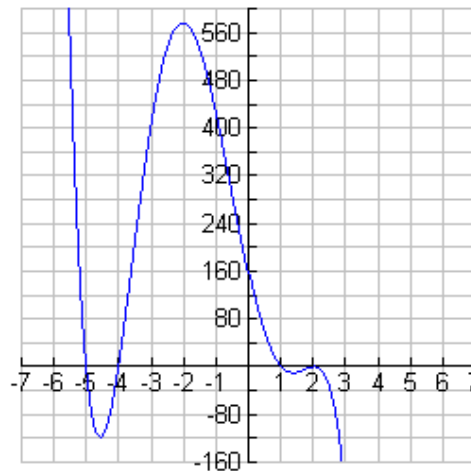
**Calculator Content:**

25. The following table lists the outstanding balances on Visa and MasterCard credit cards in billions of dollars.

Year	1980	1984	1988	1992	1996
Balance	82	108	172	254	444

- Use your calculator to produce a scatterplot of the data, letting  $x$  represent the number of years since 1980.
- Determine whether a linear or quadratic function would best fit the data.
- Graph the function with the scatterplot.
- Use your model to predict the outstanding balance in 1999 and 2003.

26. For the polynomial  $g(x) = -2x^3(x+2)(x-4)^2$
- Find the zeros of the polynomial function and state the multiplicity of each.
  - What is the most number of turning points that might be present in the graph of  $g(x)$ ?
  - Identify the leading term and end behavior for the function
27. Write the complete factored form of  $f(x) = 2x^3 + x^2 - 11x - 10$  given that  $k = -2$  is a zero.
28. Given:  $P(x) = x^4 - 3x^3 - 3x + 2$  and  $d(x) = x + 1$
- Use long division to find the quotient and remainder when  $P(x)$  is divided by  $d(x)$ .
  - Find the remainder when  $P(x)$  is divided by  $d(x)$  using the Remainder Theorem.
29. Determine the equation of the polynomial of lowest degree whose graph is given below. (x-scale: 1 interval = 1 unit; y-scale: 1 interval = 40 units). You do not need to multiply out the factors.



**Key:**

- $f(x) = \frac{2}{3}x + 8$
- $x = \text{year}; f(x) = 8.3 - 0.32(x - 1992); \text{Domain} = [1992, 2001]$
- $y = \frac{5}{3}x + \frac{1}{3}$
- $y = -\frac{3}{2}x - 2$
- $y = \frac{1}{2}x + 2$
- a.  $x = 2$     b.  $y = 5$
- 78 pounds
- a.  $a = \frac{1}{3}$
- $b = \frac{59}{85}$
- $c = -\frac{7}{3}, 1$
- a. No solution, Contradiction
- All real numbers, Identity
- $x = 2011$ , Conditional
- 1.875 gallons

11. Driver will travel  $\frac{1}{9}$  hour or approx.  $6.\overline{67}$  min. 12. a.  $\left[\frac{5}{3}, \infty\right)$  b.  $(-\infty, 0)$  c.

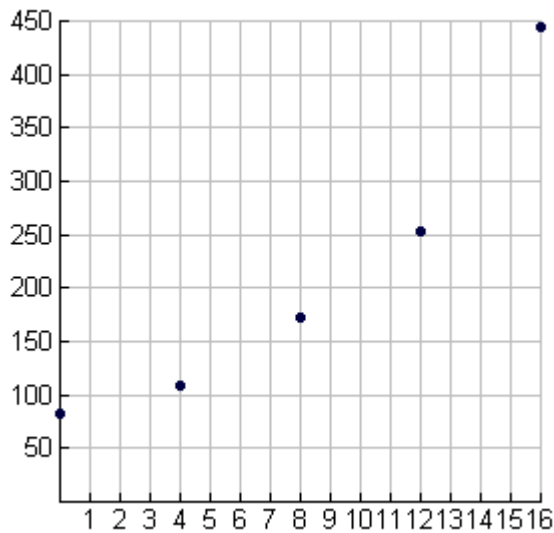
$\left(-\infty, -\frac{8}{7}\right] \cup \left[\frac{2}{7}, \infty\right)$  d.  $\left[-1, \frac{5}{3}\right]$  13. a. Demand increased since the slope is positive. b.

Between about 1989 and 1992. 14. a.  $[-4, 4]$  b.  $f(-2)=3, f(0)=-2, f(2)=0, f(3)=1.5$

15.  $f(x)=(x+5)^2-18$ ; Vertex  $(-5, -18)$  16.  $t=-1, -\frac{1}{2}$  17.  $x=-1 \pm \frac{\sqrt{14}}{2}$  18. Discriminant = 0,

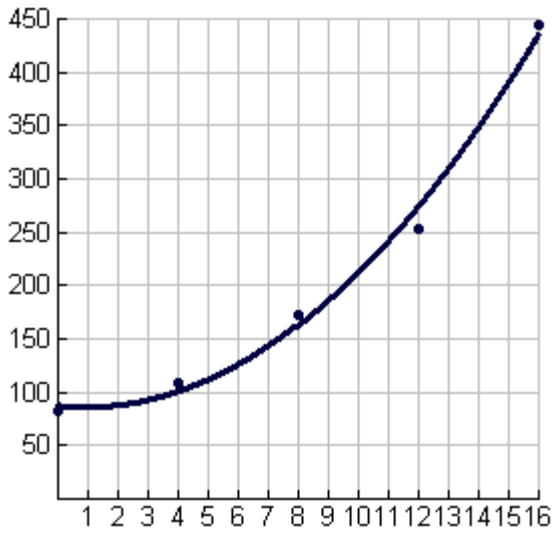
one real solution,  $x=2$ . 19.  $X=200$  20. Starting with  $f(x)$ , the graph is shifted to the left 1 unit, vertically stretched by a factor of 2, and shifted downward 5 units. 21. Inc.  $[-2, 5)$  Dec.  $(-\infty, -2]$

Constant  $[5, 8)$  22. a. Neither. b. Even, c. odd 23. a. odd, b. even, c. neither 24.  $(8, -6)$



25. a.

b. Quadratic is best fit.



c.

d. For 1999, about 588.7 billion, and for 2003, about 836.3 billion

26. a.)  $x=0$ , with mult. 3;  $x=-2$ , with mult. 1;  $x=4$ , with mult. 2      b.) 5      c.)  $-2x^6$ , both

ends down.      27.  $f(x) = 2\left(x - \frac{5}{2}\right)(x+1)(x+2)$       28. a.)  $Q(x) = x^3 - 4x^2 + 4x - 7$       r=9.

b.)  $P(-1) = 9$ , so r=9      29.  $f(x) = -2(x+5)(x+4)(x-1)(x-2)(x-2)$