

1.3E: Exercises for Section 1.2

In exercises 1 - 8, for each pair of points,

- find the slope of the line passing through the points and
- indicate whether the line is increasing, decreasing, horizontal, or vertical.

1) $(-2, 4)$ and $(1, 1)$

Answer

- $m = -1$
- Decreasing

2) $(-1, 4)$ and $(3, -1)$

3) $(3, 5)$ and $(-1, 2)$

Answer

- $m = 3/4$
- Increasing

4) $(6, 4)$ and $(4, -3)$

5) $(2, 3)$ and $(5, 7)$

Answer

- $m = 4/3$
- Increasing

6) $(1, 9)$ and $(-8, 5)$

7) $(2, 4)$ and $(1, 4)$

Answer

- $m = 0$
- Horizontal

8) $(1, 4)$ and $(1, 0)$

In exercises 9 - 16, write the equation of the line satisfying the given conditions in slope-intercept form.

9) Slope $= -6$, passes through $(1, 3)$

Answer

$$y = -6x + 9$$

10) Slope $= 3$, passes through $(-3, 2)$

11) Slope $= \frac{1}{3}$, passes through $(0, 4)$

Answer

$$y = \frac{1}{3}x + 4$$

12) Slope $= \frac{2}{5}$, x -intercept $= 8$

13) Passing through $(2, 1)$ and $(-2, -1)$

Answer

$$y = \frac{1}{2}x$$

14) Passing through $(-3, 7)$ and $(1, 2)$

15) x -intercept $=5$ and y -intercept $=-3$

Answer

$$y = \frac{3}{5}x - 3$$

16) x -Intercept $=-6$ and y -intercept $=9$

In exercises 17 - 24, for each linear equation,

a. give the slope m and y -intercept b , if any, and

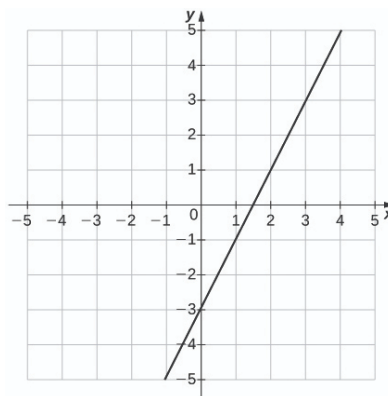
b. graph the line.

17) $y = 2x - 3$

Answer

a. $m = 2$, $b = -3$

b.



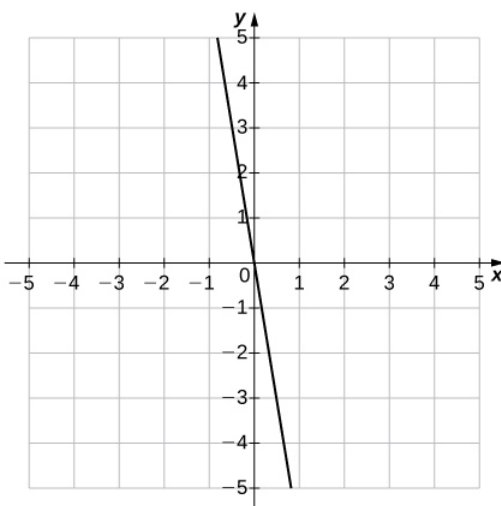
18) $y = -\frac{1}{7}x + 1$

19) $f(x) = -6x$

Answer

a. $m = -6$, $b = 0$

b.



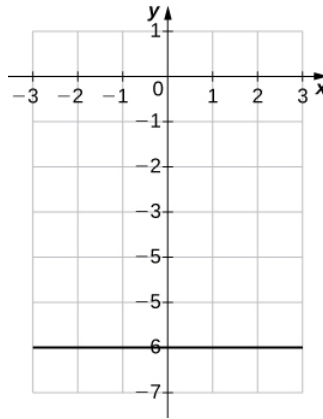
20) $f(x) = -5x + 4$

21) $4y + 24 = 0$

Answer

a. $m = 0$, $b = -6$

b.



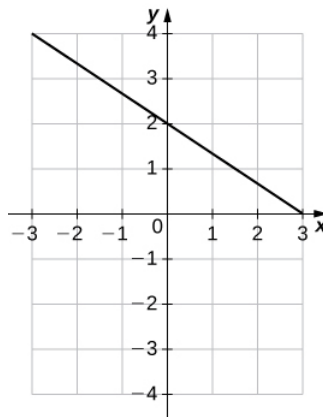
22) $8x - 4 = 0$

23) $2x + 3y = 6$

Answer

a. $m = -\frac{2}{3}$, $b = 2$

b.



24) $6x - 5y + 15 = 0$

In exercises 25 - 29, for each polynomial,

a. find the degree;

b. find the zeros, if any;

c. find the y -intercept(s), if any;

d. use the leading coefficient to determine the graph's end behavior; and

e. determine algebraically whether the polynomial is even, odd, or neither.

25) $f(x) = 2x^2 - 3x - 5$

Answer

- a. 2
- b. $\frac{5}{2}, -1$;
- c. -5
- d. Both ends rise
- e. Neither

26) $f(x) = -3x^2 + 6x$

27) $f(x) = \frac{1}{2}x^2 - 1$

Answer

- a. 2
- b. $\pm\sqrt{2}$
- c. -1
- d. Both ends rise
- e. Even

28) $f(x) = x^3 + 3x^2 - x - 3$

29) $f(x) = 3x - x^3$

Answer

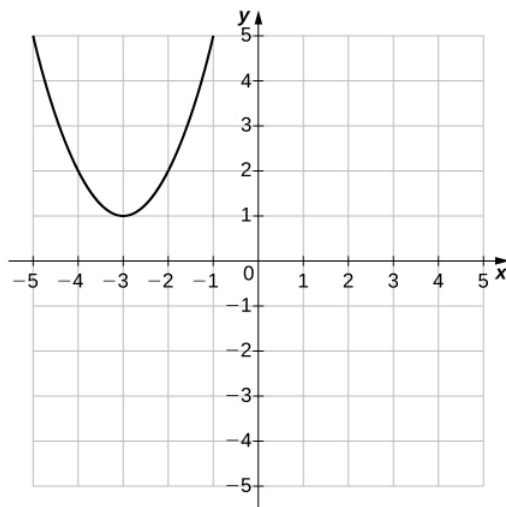
- a. 3
- b. $0, \pm\sqrt{3}$
- c. 0
- d. Left end rises, right end falls
- e. Odd

For exercises 30 - 31, use the graph of $f(x) = x^2$ to graph each transformed function g .

30) $g(x) = x^2 - 1$

31) $g(x) = (x + 3)^2 + 1$

Answer

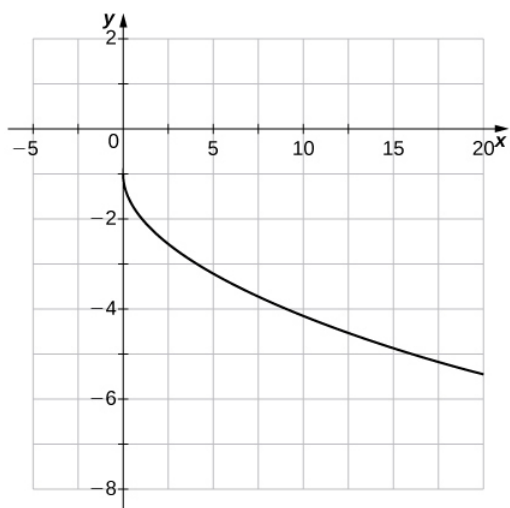


For exercises 32 - 33, use the graph of $f(x) = \sqrt{x}$ to graph each transformed function g .

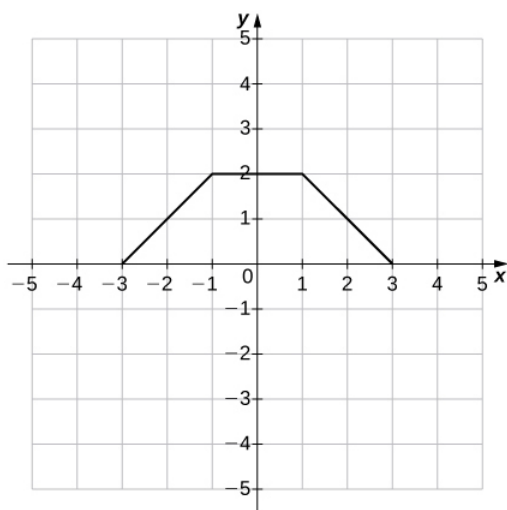
32) $g(x) = \sqrt{x+2}$

33) $g(x) = -\sqrt{x} - 1$

Answer



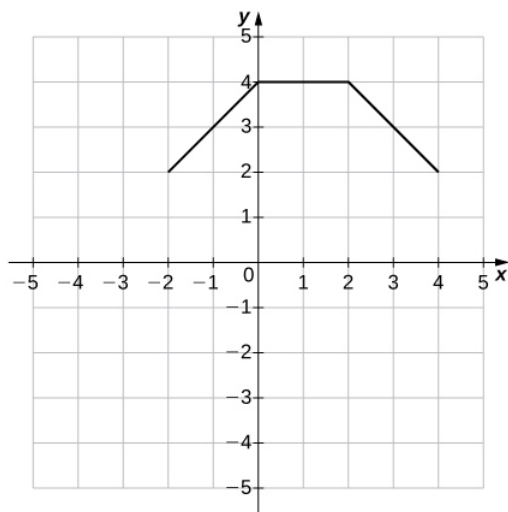
For exercises 34 - 35, use the graph of $y = f(x)$ to graph each transformed function g .



34) $g(x) = f(x) + 1$

35) $g(x) = f(x - 1) + 2$

Answer



In exercises 36 - 39, for each of the piecewise-defined functions,

a. evaluate at the given values of the independent variable, and

b. sketch the graph.

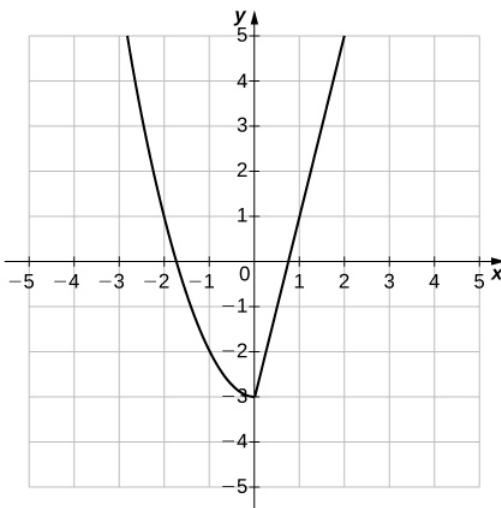
$$36) f(x) = \begin{cases} 4x + 3, & \text{if } x \leq 0 \\ -x + 1, & \text{if } x > 0 \end{cases}; \quad f(-3); f(0); f(2)$$

$$37) f(x) = \begin{cases} x^2 - 3, & \text{if } x \leq 0 \\ 4x - 3, & \text{if } x > 0 \end{cases}; \quad f(-4); f(0); f(2)$$

Answer

a. $f(-4) = 13$, $f(0) = -3$, $f(2) = 5$

b.



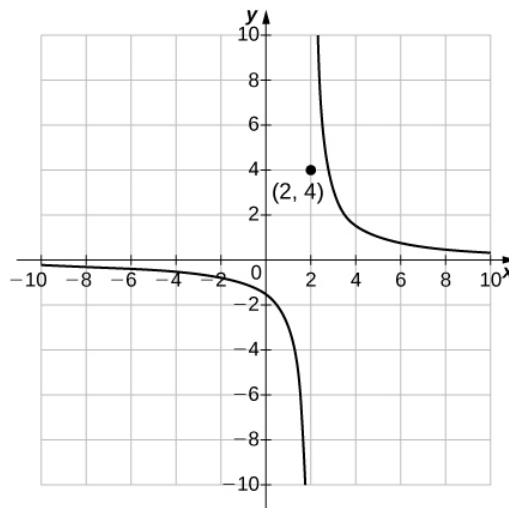
$$38) h(x) = \begin{cases} x + 1, & \text{if } x \leq 5 \\ 4, & \text{if } x > 5 \end{cases}; \quad h(0); h(\pi); h(5)$$

$$39) g(x) = \begin{cases} \frac{3}{x-2}, & \text{if } x \neq 2 \\ 4, & \text{if } x = 2 \end{cases}; \quad g(0); g(-4); g(2)$$

Answer

a. $g(0) = -\frac{3}{2}$, $g(-4) = -\frac{1}{2}$, $g(2) = 4$

b.



In exercises 40 - 44, determine whether the statement is *true* or *false*. Explain why.

40) $f(x) = \frac{4x+1}{7x-2}$ is a transcendental function.

41) $g(x) = \sqrt[3]{x}$ is an odd root function.

Answer

True; $n = 3$

42) A logarithmic function is an algebraic function.

43) A function of the form $f(x) = x^b$, where b is a real valued constant, is an exponential function.

Answer

False; $f(x) = x^b$, where b is a real-valued constant, is a power function

44) The domain of an even root function is all real numbers.

45) [T] A company purchases some computer equipment for \$20,500. At the end of a 3-year period, the value of the equipment has decreased linearly to \$12,301.

- Find a function $y = V(t)$ that determines the value V of the equipment at the end of t years.
- Find and interpret the meaning of the x - and y -intercepts for this situation.
- What is the value of the equipment at the end of 5 years?
- When will the value of the equipment be \$3000?

Answer

- $V(t) = -2733t + 20500$
- $(0, 20, 500)$ means that the initial purchase price of the equipment is \$20,500; $(7.5, 0)$ means that in 7.5 years the computer equipment has no value.
- \$6835
- In approximately 6.4 years

46) [T] Total online shopping during the Christmas holidays has increased dramatically during the past 5 years. In 2012 ($t = 0$), total online holiday sales were \$42.3 billion, whereas in 2013 they were \$48.1 billion.

- Find a linear function S that estimates the total online holiday sales in the year t .

- b. Interpret the slope of the graph of S .
- c. Use part a. to predict the year when online shopping during Christmas will reach \$60 billion.

47) [T] A family bakery makes cupcakes and sells them at local outdoor festivals. For a music festival, there is a fixed cost of \$125 to set up a cupcake stand. The owner estimates that it costs \$0.75 to make each cupcake. The owner is interested in determining the total cost C as a function of number of cupcakes made.

- a. Find a linear function that relates cost C to x , the number of cupcakes made.
- b. Find the cost to bake 160 cupcakes.
- c. If the owner sells the cupcakes for \$1.50 apiece, how many cupcakes does she need to sell to start making profit? (Hint: Use the INTERSECTION function on a calculator to find this number.)

Answer

- a. $C = 0.75x + 125$
- b. \$245
- c. 167 cupcakes

48) [T] A house purchased for \$250,000 is expected to be worth twice its purchase price in 18 years.

- a. Find a linear function that models the price P of the house versus the number of years t since the original purchase.
- b. Interpret the slope of the graph of P .
- c. Find the price of the house 15 years from when it was originally purchased.

49) [T] A car was purchased for \$26,000. The value of the car depreciates by \$1500 per year.

- a. Find a linear function that models the value V of the car after t years.
- b. Find and interpret $V(4)$.

Answer

- a. $V(t) = -1500t + 26,000$
- b. In 4 years, the value of the car is \$20,000.

50) [T] A condominium in an upscale part of the city was purchased for \$432,000. In 35 years it is worth \$60,500. Find the rate of depreciation.

51) [T] The total cost C (in thousands of dollars) to produce a certain item is modeled by the function $C(x) = 10.50x + 28,500$, where x is the number of items produced. Determine the cost to produce 175 items.

Answer

\$30,337,500

52) [T] A professor asks her class to report the amount of time t they spent writing two assignments. Most students report that it takes them about 45 minutes to type a four-page assignment and about 1.5 hours to type a nine-page assignment.

- a. Find the linear function $y = N(t)$ that models this situation, where N is the number of pages typed and t is the time in minutes.
- b. Use part a. to determine how many pages can be typed in 2 hours.
- c. Use part a. to determine how long it takes to type a 20-page assignment.

53) [T] The output (as a percent of total capacity) of nuclear power plants in the United States can be modeled by the function $P(t) = 1.8576t + 68.052$, where t is time in years and $t = 0$ corresponds to the beginning of 2000. Use the model to predict the percentage output in 2015.

Answer

96% of the total capacity

54) [T] The admissions office at a public university estimates that 65% of the students offered admission to the class of 2019 will actually enroll.

- a. Find the linear function $y = N(x)$, where N is the number of students that actually enroll and x is the number of all students offered admission to the class of 2019.
- b. If the university wants the 2019 freshman class size to be 1350, determine how many students should be admitted.

Contributors

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